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The Swift

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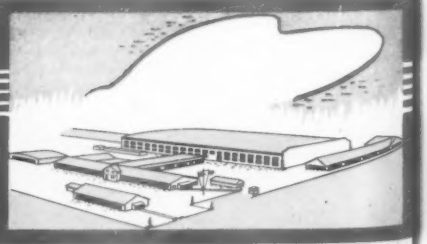
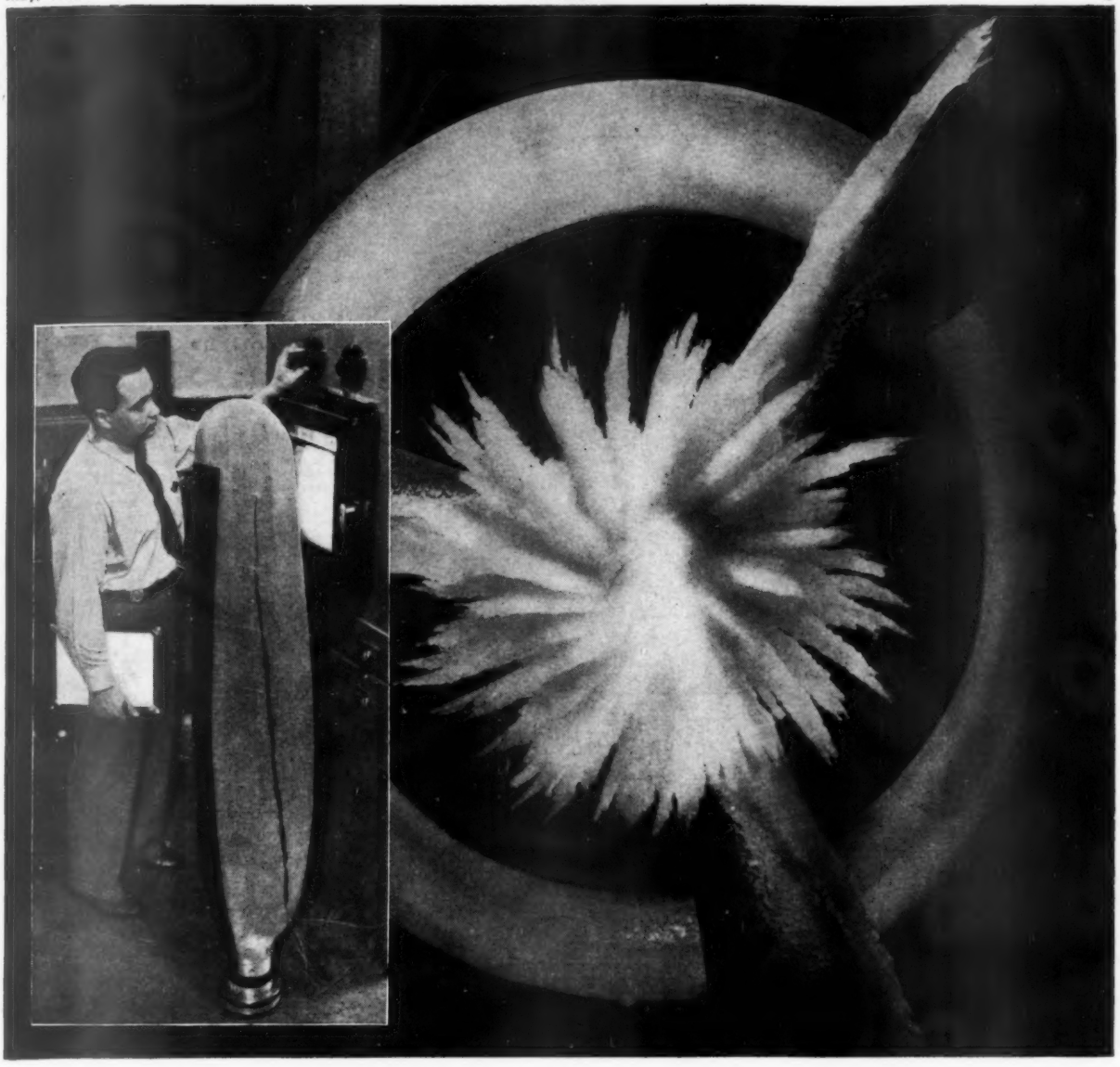
John Kennedy, President





Push-button defrosting for planes

AN 80-MILE WIND, roaring through the B. F. Goodrich refrigerated wind tunnel, created the Jack Frost effect on the propeller model above.

The exaggerated ice flower on the hub isn't as serious as it looks; but fingers of ice, creeping up the blades, were a big worry to pilots for years. For in flight, ice on the blades means loss of power, bad balance, and excessive vibration.

To a pilot, the smaller picture looks a lot better. It's a propeller equipped with a new B. F. Goodrich development called an electrically heated propeller shoe. It's shown here being tested (the wires are part of the testing equipment; they are not on the blade in flight).

With these shoes on his propeller blades, a pilot can defrost them as simply as a housewife defrosts a refrigerator . . . and lots quicker. The pilot just touches a switch and electric current begins to generate heat in the shoe, which melts off ice.

B. F. Goodrich equipment protects many other parts of the airplane from ice. Best known are the De-Icers, which crack ice off as it forms on wings and tails, keeping these surfaces clean and smooth for safer flying. De-Icers were developed and are made exclusively by B. F. Goodrich. Years of ice-fighting experience are back of this equipment. It means a safer, more comfortable flight if you fly today or when you fly tomorrow. *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

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FLYING

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MAY • 1946

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THE COVER

FLYING's cover photograph was made during the course of a one-hour flight from Los Angeles to Palm Springs. The flight was made for our photographer, after the airplane had been reassembled by engineers who had been working on it. A number of changes are planned for the Navion. One may be a test of a General Motors two-cycle engine; numerous structural and design revisions probably will be made before the model is ready for line production.

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FLYING
MAY
1946

LET'S BE *Realistic* ABOUT PRIVATE FLYING

Mr. Piper and one of his Cubs.

Says

WILLIAM T. PIPER

President, Piper Aircraft Corporation

EDITOR'S NOTE

Much of the criticism directed against personal plane designs in recent months has come from persons not in the aircraft manufacturing industry. In many instances they have not given recognition to the problems of the manufacturer and his reasons for building airplanes the way he does. FLYING herewith presents the reply to these critics, by the largest manufacturer of personal aircraft in the world.

IT HAS been said, variously, that private flying is oversold, that lightplane research is everybody's stepchild, that personal planes lack utility, and that our air-minded millions are losing their war-born enthusiasm for aviation.

There is something curiously alike in all these plaintive outcries, as if their authors had awakened from a dream of the Big Rock Candy Mountains and found that, alas, the Coca Cola springs had never actually bubbled and the cigaret trees never really bloomed.

It is time, I think, to reappraise private flying in the light of cold hard facts. During the war we heard interesting tales of what the post-war plane and post-war flying would be like and from these stories we conjured up visions of all-metal family airplanes that would land at 30 m.p.h., cruise at 150 or 200 m.p.h., fly us automatically through any kind of bad weather, shed their wings on the ground and turn conveniently into automobiles—and, of course, be absolutely accident-proof. All this was to come about for the price of a small automobile.

This has been a worthy dream but it could not square with the immediate post-war facts any more than our dreams about post-war homes have squared with the actual housing situation today, or our dreams of the post-war automobile have squared with the 1941 models which are coming off the assembly lines. (*Continued on page* 119)

Chief arbiters at the Bermuda Conference were (left to right): L. Welch Pogue, chairman of CAB; Harllee Branch, CAB member; Stokeley Morgan, of the U. S. State Department; Sir William Hildred, director of the International Air Traffic Association; Sir Henry Self, head of British delegation; George Baker, head of American delegation; Oswald Ryan and Josh Lee, CAB members.

BERMUDA BARTER

British-American bargaining led to agreements that go far toward promoting world air travel.

By F. R. STOUT

AROUND a table in a sun-washed Bermuda hotel sat some 30 men listening intently. Lining the center of the table were cards reading "American Delegation," or "British Delegation." It was almost as though they marked a line of battle. The speaker, Sir Henry Self, director general designate of British civil aviation, was opening the first post-war Anglo-American civil aviation conference.

Twenty-seven days later, in the same room, Sir Henry rose to speak again. The same men listened.

"And now," said Sir Henry, "I invite the American delegation to sign these documents."

A secretary placed a sheaf of parchment sheets in front of George P. Baker, director of the office of transport and communications policy of the U. S. State Department. Baker wrote his name below Self's. That's the briefest sort of summary as to how two great English-speaking nations were joined in an air pact. The details of how they terminated the diplomatic bout begun 15 months before at the International Civil Aviation conference of 54 countries in Chicago take a bit longer to review.

It may be taken for granted that neither country got everything it wanted out of the agreement. During the 27 days of negotiations, there were times when it appeared either delegation might justifiably pack up and go home. But they stuck it out. And, in the end, they produced a contract that offers the average man a good chance of some day flying the Atlantic. Already the International Air Traffic Association has approved temporary reduction of the New York-London fare from $375 to $360, and a committee has been appointed to present cost studies which may lead to further reductions.

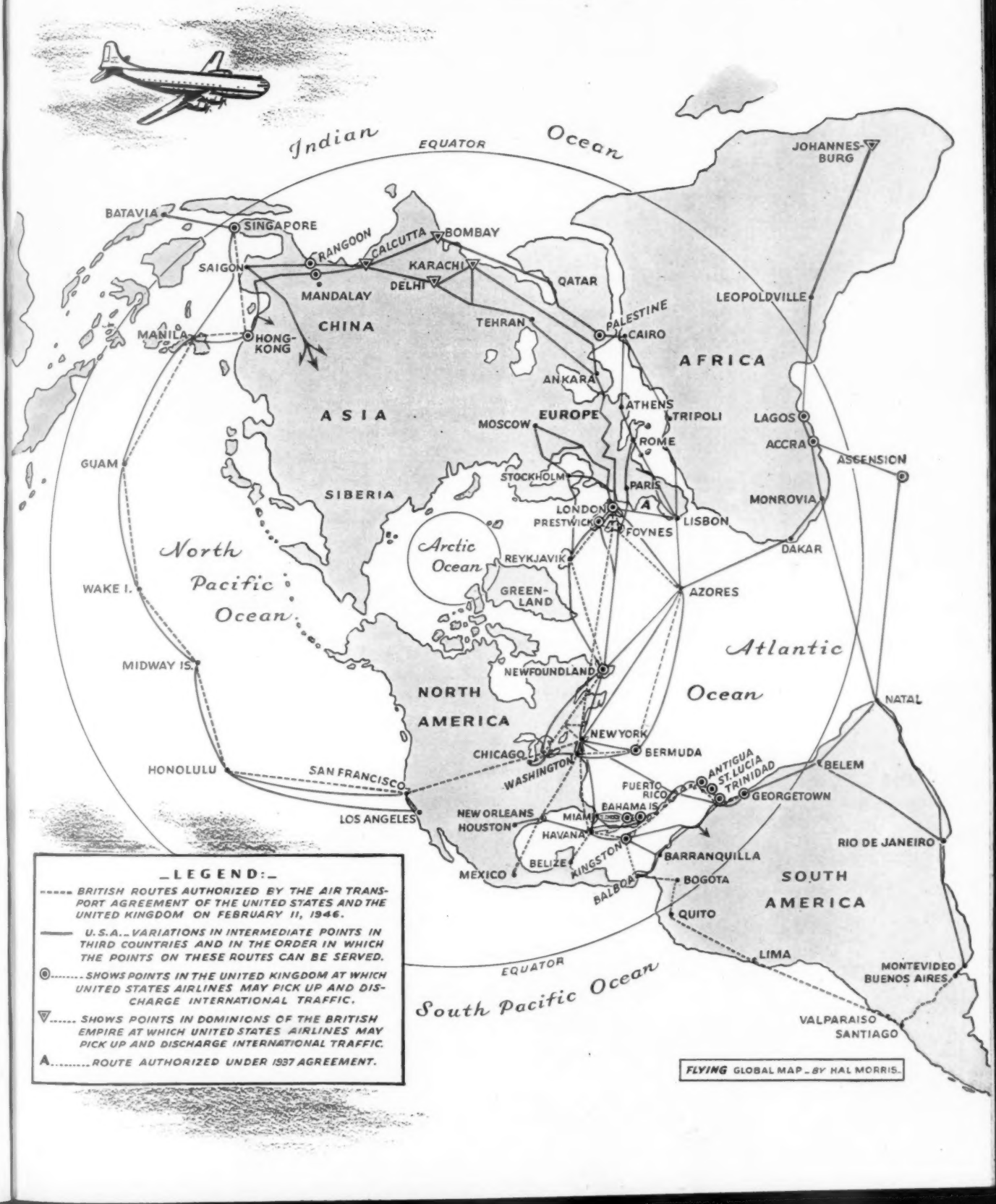
This means that the British made radical concessions, moving far from their policy line of restrictive controls on flight frequencies and traffic rights—both feared by U. S. airlines.

There was little common ground for such understanding at the beginning of the conference. The British, plagued by tremendous economic concerns, regarded aviation as through the wrong end of a telescope. They were not ready to fly the oceans because they had no fast, long-range commercial aircraft. Moreover, the British are not a nation of air travelers.

Quite the reverse was true of the United States and its airlines, builders of the world's foremost air transport industry. Notwithstanding its heavy con-

(*Continued on page* 109)

WORLD ROUTES AGREED UPON



LEGEND:

------ BRITISH ROUTES AUTHORIZED BY THE AIR TRANSPORT AGREEMENT OF THE UNITED STATES AND THE UNITED KINGDOM ON FEBRUARY 11, 1946.

——— U.S.A.—VARIATIONS IN INTERMEDIATE POINTS IN THIRD COUNTRIES AND IN THE ORDER IN WHICH THE POINTS ON THESE ROUTES CAN BE SERVED.

⊙..... SHOWS POINTS IN THE UNITED KINGDOM AT WHICH UNITED STATES AIRLINES MAY PICK UP AND DISCHARGE INTERNATIONAL TRAFFIC.

▽..... SHOWS POINTS IN DOMINIONS OF THE BRITISH EMPIRE AT WHICH UNITED STATES AIRLINES MAY PICK UP AND DISCHARGE INTERNATIONAL TRAFFIC.

A..... ROUTE AUTHORIZED UNDER 1937 AGREEMENT.

FLYING GLOBAL MAP—BY HAL MORRIS

OUR WRECKED AIR FORCES

The military is doing a spectacular job of destroying its own air might.

By FRED HAMLIN
Washington Editor of FLYING

SINCE the defeat of the Axis, the United States has done its most spectacular job of destroying an air force—its own. The job is spectacular because it has been done nearly three times as fast as it took to destroy the Nazi and Japanese air forces in the air, and because it has cost the taxpayer some $6,500,000,000 since V-J Day.

These statements are not made as criticism of either Government or Army Air Force policy, but as facts obtained from experts—the men who led us to victory in the air. During the war, the estimated total number of enemy aircraft losses in combat with the AAF was 30,000 in Europe, 10,000 in the Pacific—a total of 40,000. This means a monthly loss of some 890 enemy planes during the 45 months from December, 1941, through August, 1945.

By declaring planes surplus which were later junked—or soon will be—the AAF, aided by other Government agencies, in the 18 months from January, 1945, through June, 1946, will have destroyed some 47,400 aircraft, an average of approximately 2,633 per month, or nearly three times the battle attrition wreaked on the Axis. Although some funds may be recovered, it also means an estimated $6,778,200,000 of taxpayer money turned to junk. Nor do these figures include Navy planes which will be in the junk category by July of this year—a grand total of some 71,000 planes that cost the nation approximately $10,153,000,000.

Everybody agrees that this vast and

Scrap piles now, these metal pieces once were part of the U.S. Navy's flying forces.

War-weary bombers of all categories, sizes and weights await salvage crews at the Walnut Ridge, Ark., Army Air Base disposal area. Photographed are Fortresses, Liberators, Mitchells and Marauders which will be destroyed to make way for new planes.

costly demobilization of equipment was unavoidable. Air Forces officials, the Reconstruction Finance Corporation—whose job it is to get what value it can out of the abandoned planes—and the aviation industry see eye to eye on that. The way had to be cleared for new models. Men, as well as planes, were being demobilized wholesale with the wartime Army Air Forces of 2,500,000 men tobogganning toward a low of approximately 400,000. Since it takes an average of 18 to 20 trained men to keep a fighter flying, their departure meant that surplus planes would also have to go.

But beyond that, it also meant—and still means—that remaining equipment and the AAF as an organization are now threatened with disintegration. As the draft was no respecter of personalities and talents, so with the demobilization. Recent AAF estimates are that, out of 101,000 radio operators trained during the war, 961 will still be on active duty at the end of this summer. The number of AAF mechanics will drop from 130,000 to 6,000; of the total number of selectees trained during the war, only 90,000 will answer roll-call.

Thus, the AAF's world reputation of being the most powerful air arm in history is now vastly exaggerated. Even the production of new planes has fallen off to a point where such a war-stricken nation as Britain went ahead of us in the early winter, despite British scrapping which has been proceeding at the modest rate of less than 500 a month. As for the remaining AAF personnel on duty at home or abroad, reports indicate that it has reached an all-time low in morale.

"The AAF has gone to hell and before long we seem destined to have a handful of planes, inadequate ground crews, poorly co-ordinated flight personnel—a fighting unit that is more a liability than an asset," said one high Army spokesman recently. "If the current trend hardens into policy, we will be lucky to come out with an Air Force matching that we had when the Japs struck at Pearl Harbor. We are in imminent danger of resuming the same step-child role under which military aviation suffered after World War I."

While they view with regret and some misgivings the destruction of our World War II air arm, AAF leadership agreed to it for another reason—if the planes were not junked, our air arm would go into the post-war era flying obsolete equipment. This, they feel, would be worse than no Air Force at all, lulling the nation into an utterly false feeling of security.

"Certainly an essential factor in any post-war program is a healthy aviation industry," says Maj. Gen. Lauris Norstad, chief of the air staff for plans and policy. "While making the best possible use of the planes left over from the war, we must provide for wide experimentation and a reasonable turn-over in equipment. The miracle of our bombers in World War

Jet-propelled McDonnell Phantom (FD-1) is first all-jet plane ordered for Naval carrier duties. It typifies the new airplanes which are making our present aerial forces obsolete.

II can be credited, not only to the AAF, but also to a progressive aircraft industry.

"To achieve a similar miracle if another emergency should arise necessitates long-range planning, constant vigilance, expert research and continued vigor and enterprise in the building of aircraft, both civil and military."

Peacetime need and not another war is paramount in the AAF post-war thinking.

"The only mission for the Air Forces in the future of aviation," says Gen. H. H. Arnold, "must be to preserve the peace. Air power today is the first priority weapon for world peace and the first weapon of attack."

He adds a warning:

"It may be the only weapon used should there be another war. Similarly, as a means of protecting peaceful people from international thugs, overwhelming air power at the disposal of an international security council is the present way to peace. The fantastic possibilities of weapons not yet proved, not yet fully developed, may some day change the situation. But until—and unless—they do, we must achieve first-quality air power."

To restore the United States to this leadership, top AAF planners propose an active Air Force of 400,000 men, 50,000 of whom would be officers; an Air National Guard of some 45,000 men, 3,000 of whom would be pilots; and a reserve of approximately 1,000,000 men, some 22,500 of whom would be pilots.

The AAF would welcome the opportunity to assume obligations for 87 squadrons of National Guard, at least one squadron per state, and with the location of the surplus weighted according to population. Only top-side Army and Congressional approval stands in the way of the Air Forces going ahead on this program full throttle.

Reserves and National Guard would share 6,000 planes, half trainers, half fighters, including light bombers. The regular AAF would have a complement of approximately 8,200 planes. An additional 3,000 planes would be "pipe-liners" and reserves, latest models getting into production and experimental models of all varieties. A complete turn-over in equipment would be mandatory at least every five years, insuring up-to-the-minute planes, fast-paced research and a healthy civilian fighter manufacturing industry.

Special emphasis would be put on picking and training personnel. The program would be designed to attract young men. By the same token, plans are already being considered for retiring older officers and men from the AAF at a pace more rapid than in other services.

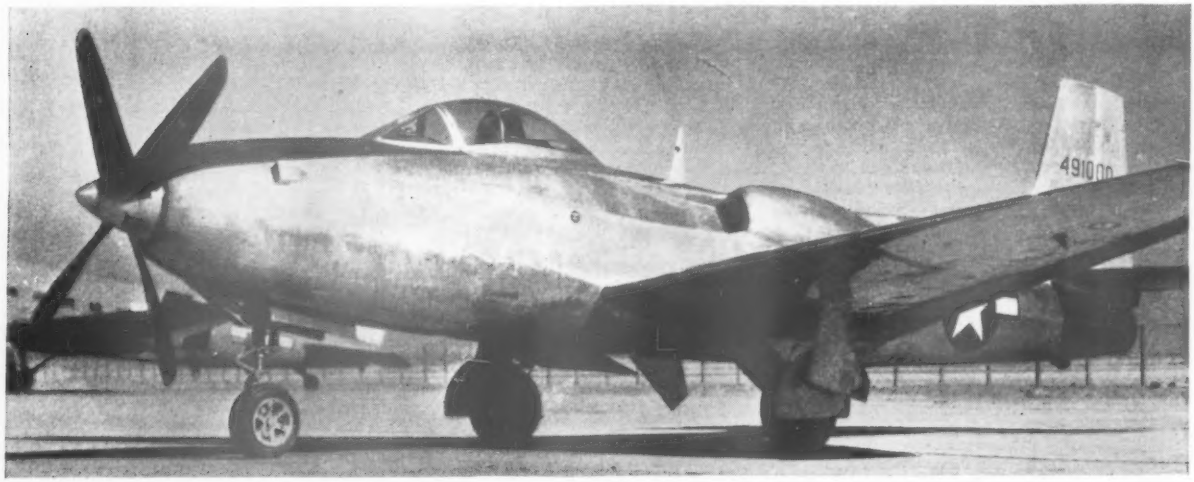
Reserves would have the opportunity of from one week to a month of flight training annually, with the option of getting extended active duty for from six months to a year. National Guardsmen would be able to have as much as 100 hours of flight duty per year.

AAF, top group in the program, would embrace 70 groups, 25 of very-heavy bombers of the *Superfortress* type or larger; 25 of fighters, including long-range escorts and intercepters; five groups of medium and light bombers; 10 of transports and troop carriers; and five for tactical reconnaissance.

The Army Air Forces program as here outlined would take care of the United States' contribution to the United Nations Organization, as well as domestic security. But whether the program will survive the gauntlet of the regular Army high command, the Bureau of the Budget and Congress is the gravest question now facing AAF headquarters.

It is doubly grave to those persons who envision another unguarded emergency with 10 Pearl Harbors and enemy planes striking simultaneously in force at all the nation's great population and defense centers.

The belief is that if this question of an adequate aerial defense is not answered soon, a post-war AAF of any worth will have to be built from scratch, almost a plane and a crew at a time, at additional huge cost to the taxpayer and at risk of permanent peril to national security. END



Gas turbine engine is used for the first time in Consolidated Vultee's XP-81, which is intended to replace wartime Army fighters. With an additional jet engine in rear, XP-81's total power is about equal to that of the four-engined Superfortress.

Television FOR PRIVATE FLYING?

By KURT RAND

In every cockpit a televised map of the ground beneath you—that's air navigation with a future.

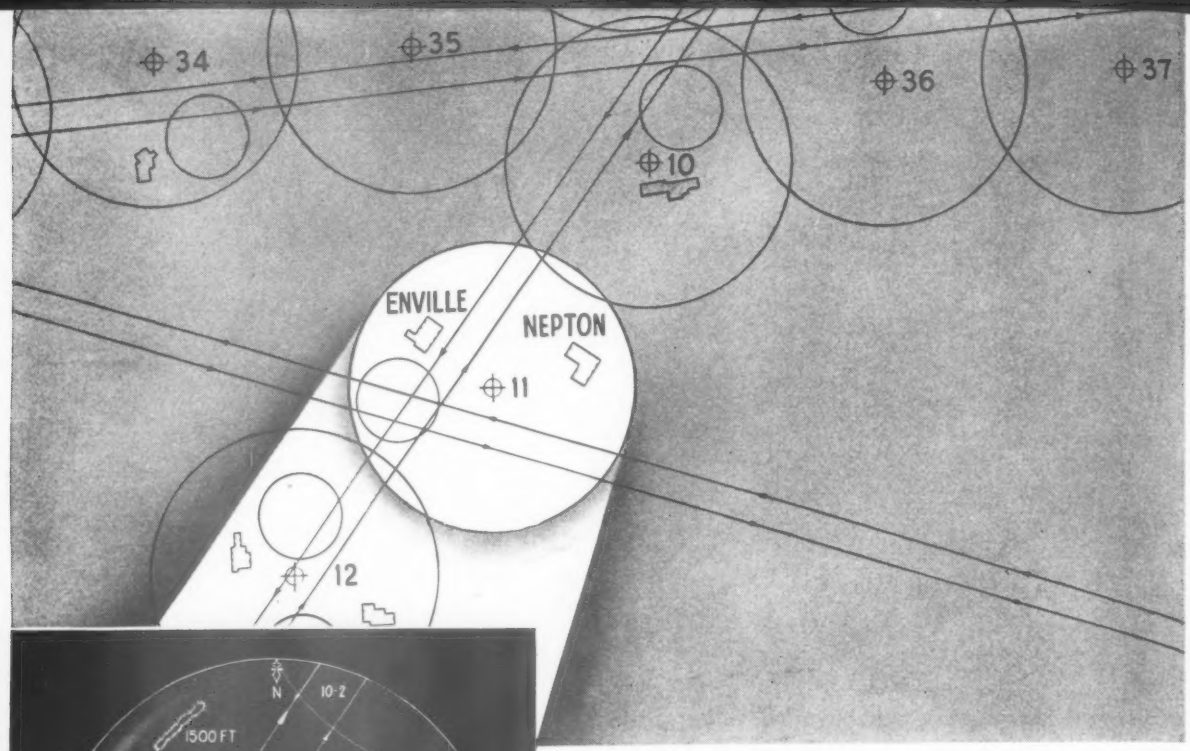
FOR YEARS pilots have dreamed of a miraculous navigation system whereby they might be able to see as well under blind flying conditions as they customarily see on the clearest days. A former lightplane pilot with 200 hours and membership in AOPA has recently applied for patents on a radar-television system called Teleran which approaches that ideal, though it still falls a step short of it.

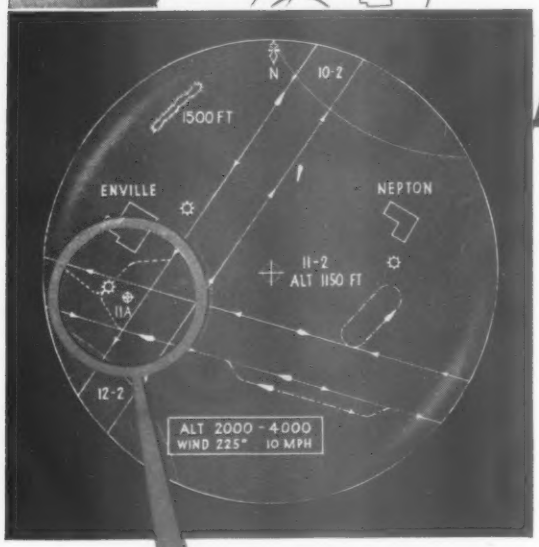
Teleran is a blind flying system whereby a televised navigation map of the area over which the plane is flying appears continually on a screen on the instrument panel. Superimposed over the televised map are radar blips which indicate every plane in the area at the altitude where the aircraft is flying. Changes in any flight condition are noted on the screen as quickly as they occur.

The Radio Corporation of America says that Teleran promises to revolutionize post-war aerial navigation and remove a majority of the collision and bad weather hazards now inherent in flying. It is the brain-child of Loren F. Jones, a pilot and one-time ham radio operator. A former student at Washington University, St. Louis, Jones combined his radio lore with his pilot experience after soloing in 1927. His knowledge of radio and electronics plus what he knew about bad weather flying, resulted in the development of Teleran.

Jones began combining these two hobbies in 1941 but other wartime duties at RCA prevented his crystallizing his ideas until about a year ago. At that time, RCA became so interested that it turned loose a whole battery of technicians to work on the Teleran idea. Heading the project is Dr. Douglas Ewing who, during the war, was associate director of the world's largest radar laboratory at Massachusetts Institute of Technology. Dr. Ewing is now headquartered at the RCA radar laboratories at Camden, N. J. Research in the field also is being done at Princeton and the cathode ray end of the work is going forward at RCA's Lancaster, Pa., plant.

Developments have already reached the point where experts in charge predict that a complete Teleran unit will be ready for demonstration on the ground—in an adaptation of the Link Trainer—within a year. A ground-and-air-demonstration will be ready for operation within two years, and Teleran will be ready for public use within five years. RCA is quick to add that present ground-air equipment as used by Army, Navy, CAA and the airlines is adequate for current traffic but that it





Networks of Teleran stations spaced along the airways would broadcast a constantly changing map to each plane as it advanced on its course. At left is a reproduction of the televised map for the Enville-Nepton circle (outlined above) at a 2,000-4,000-foot altitude. The radar blips superimposed on the map show location of all planes at the same altitude.

Screen (below) enlarges as altitude is lost. Plane is identified by diagonal line through pip.

will become overloaded when the number of planes, especially in private flying, increase. They anticipate that about the time the increase has overloaded current facilities Teleran will be available to solve the problem.

Aware of navigation problems as only a pilot can be, Jones first considered a radar in every cockpit. But radar is expensive and too heavy for most lightplanes. Jones then turned to the possibilities of television. Here he made his first forward step—television sets for his purpose could weigh less than 100 pounds and could be built for (a guess price) as little as $500. If Teleran wins a mass market this price may become even lower.

But how to make the television screen register almost instantaneous information that would keep a pilot out of trouble flying blind over an airport or on an airway, where scores of other planes were blindly facing the same problem? It is not as simple as it sounds, of course—but Jones licked the problem by installing radar on the ground so synchronized with the television in the cockpits that every pilot will "see" his own plane on a map of the area at all times. Better, he will also get a moving picture of all other planes in the area at the level at which he is flying.

Changes on the screen will be noted as quickly as they occur in the air. Indeed, a groundman at the controls of the ground radar-television installation may note instantaneously special changes or instructions by pencilled directions which will appear automatically and instantaneously on the cockpit television equipment.

On their television screens pilots also will get weather, windspeed, a view of obstacles that may be in their path, and an image so strong that it will show even in the bright sunlight above an overcast—all with four easily-operated dials on the face of the equipment.

Even planes without Teleran equipment will be included in the safety pattern, since the ground search radar will be able to observe the position and movement of all aircraft. Provision is made in the system for separating such planes from other air-

craft on the television maps and displaying them exclusively on a separate ground indicator.

Depending on the menace that such aircraft might present to others, this data will be transmitted to some or all television-equipped planes in the area or will be used by the traffic controller only to warn other aircraft. Temporary courses of unequipped planes can be drawn on the maps by hand if it is felt they are needed.

Teleran is a coined word—*TELE*vision plus *R*adar *A*ir *N*avigation—and is a natural progression of RCA experience with airborne radar dating from 1935 and with airborne television dating from 1936.

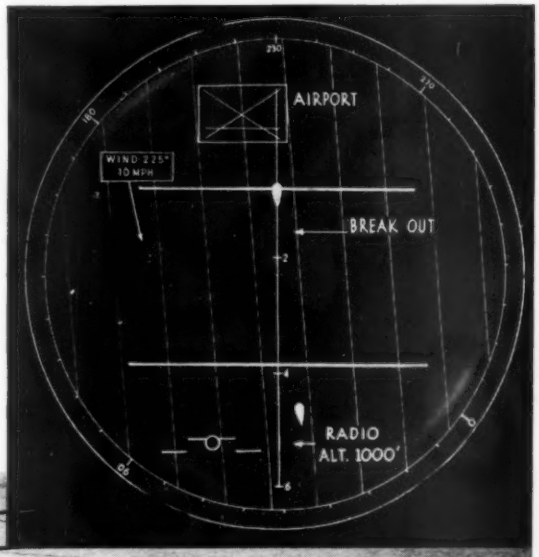
"In its simplest form," to quote Mr. Jones, "teleran employs a ground search radar which surveys the air-space and displays the information obtained on a cathode ray tube. This radar presentation is viewed by a television camera, a map of the area is superimposed either optically or electrically, and the combination picture is broadcast by a television transmitter. The pilot sees his plane as a spot of light moving across the map; other planes are similar spots, or pips, moving along their actual routes."

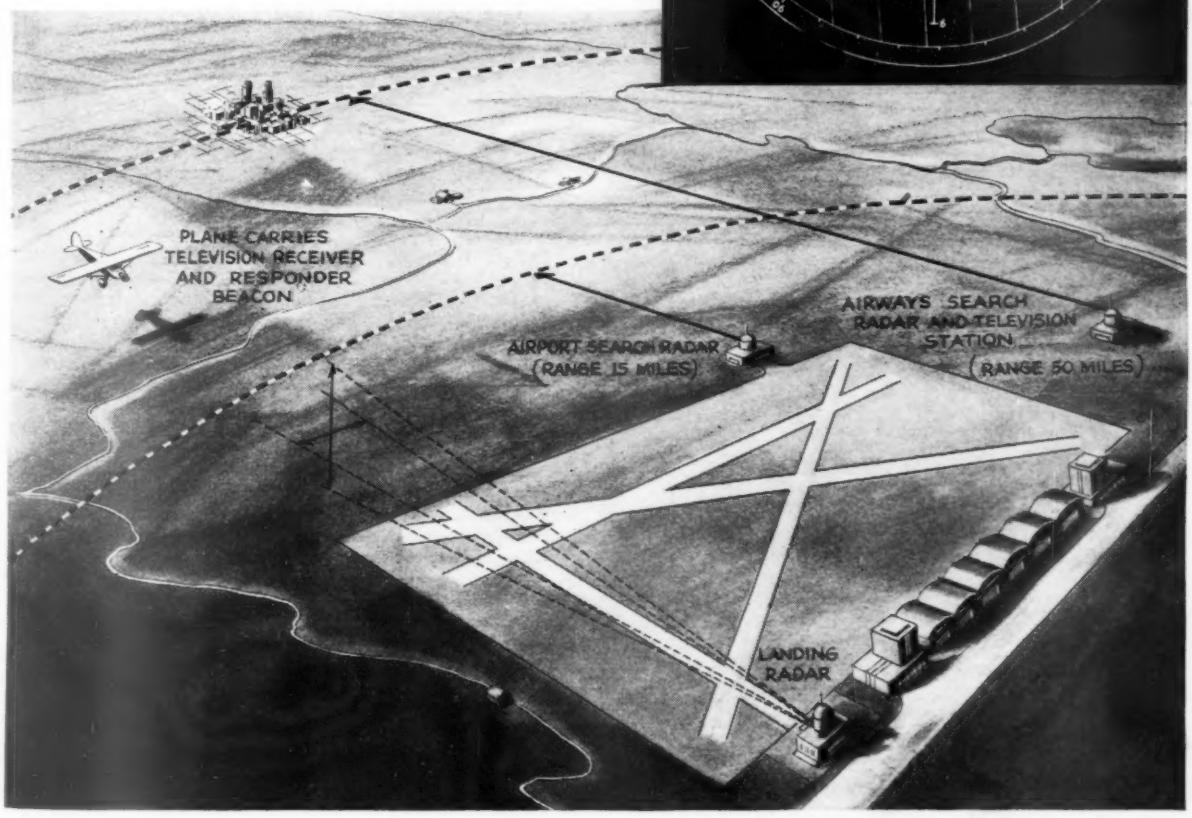
But Teleran goes even further, separating the radar echoes according to altitude and transmitting a separate picture for each altitude level.

"This separation," Mr. Jones explains, "is accomplished by having each aircraft carry a transponder, consisting of a receiver and transmitter connected together, so that the transmitter emits one or more pulses when the receiver picks up a pulse from the radar. If the transmitter emits two pulses separated by a time interval which depends on altitude, the discriminator at the ground station can be made to sort out the responses automatically according to altitude. The responses from different altitudes are then displayed on separate indicators."

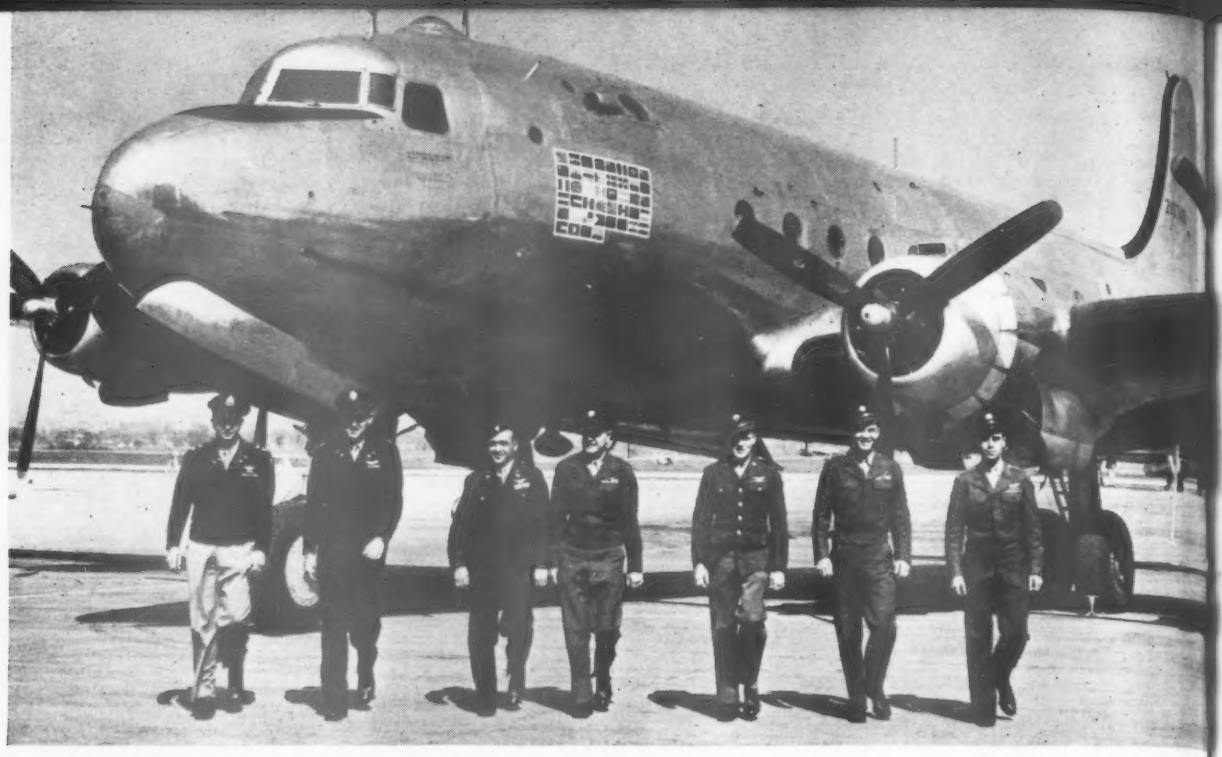
In the cockpit, the pilot simply has to tune in at the level which he is flying, where his and other planes will appear in the form of radar pips. If he loses altitude the picture tuned on the television screen dims and he then tunes to a lower altitude. Screens overlap so that he never needs fly with a blank or blurred screen.

Although it is possible for a pilot to fly a course by observing the position of the pip and the direction of the trail, the prompt indication of changes in heading provided by the flux-gate compass or directional gyro are of great assistance. In radio range flying, for example, such compasses (*Continued on page* 105)





Landing by Teleran. Televised map at right shows how screen would look during the approach. Vertical line indicates whether plane is to the right or left of the course and a moving horizontal line shows whether it is above or below the proper glide path. Diagram below shows general arrangement of Teleran units, with plane approaching.



The Sacred Cow's crew, Col. Henry T. Myers at the left. The big Skymaster also has been known as "The Flying White House" and "The VIP (Very Important People) Express." It has flown the late President Roosevelt, Winston Churchill, and other notables.

THE PRESIDENT'S

President Truman arrives in Kansas City aboard the Sacred Cow. Daughter Margaret is on left.

Does the President take risks? Not with Colonel Myers flying.

SHE'S plush, that airplane of President Truman's, but you can take it from Col. Henry T. (Hank) Myers that there is probably no safer airplane flying today. FLYING interviewed Colonel Myers recently, after all that uproar in the daily press about the chief executive risking his neck flying in dirty weather. It's all so much prop-wash, the colonel says.

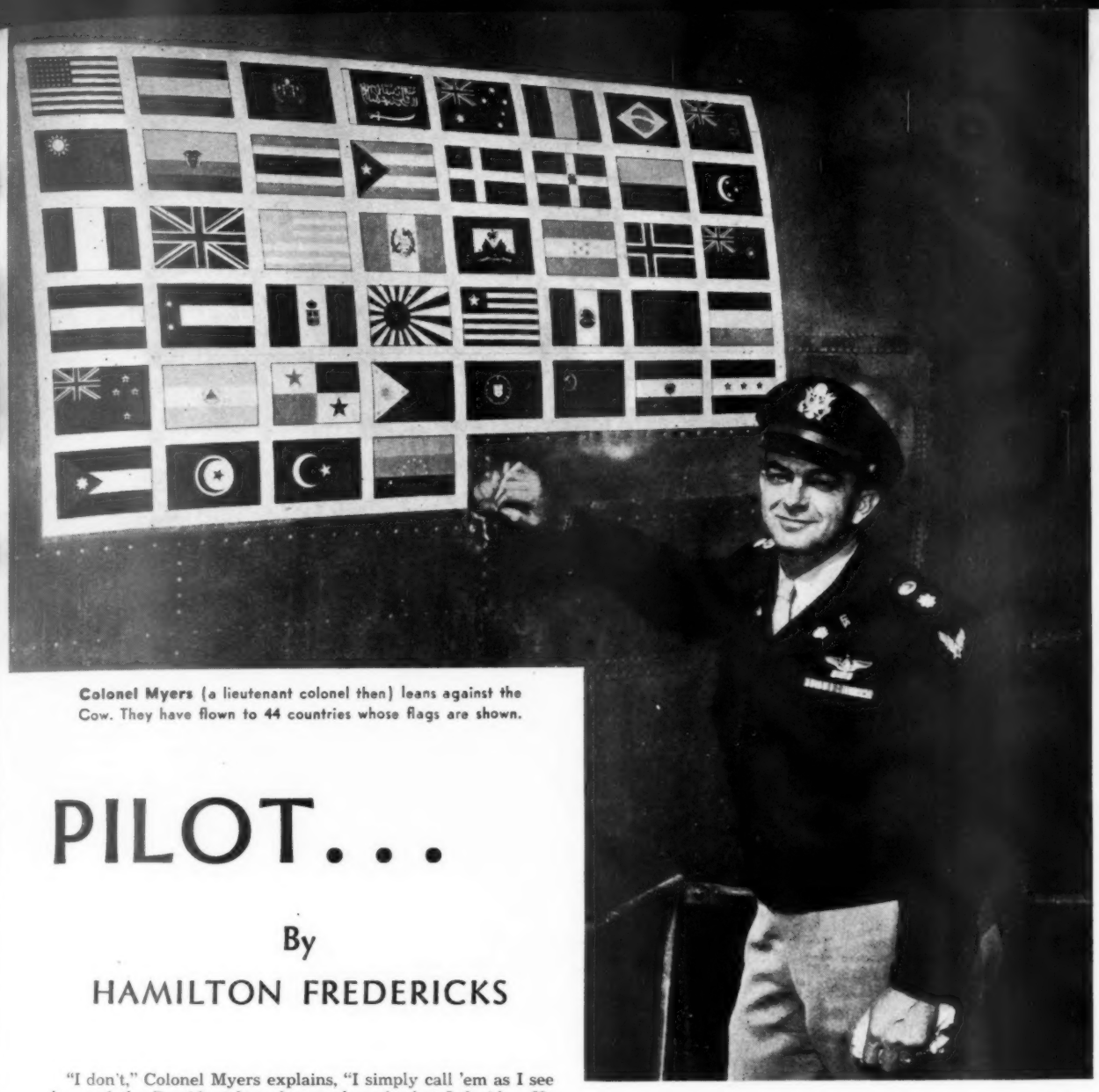
Unlike many news commentators, congressmen and editorial writers, Colonel Myers is not in the least disturbed by the "dangers" in flying the presidential C-54, the *Sacred Cow*.

"Given an airplane like the *Sacred Cow* and reasonably common-sense handling," he said, "and flying is safer than any other form of transportation. Trains can jump the tracks, automobiles run into each other and ships founder. In bad weather none of them is fast enough to fly around it or go off somewhere and sit down till it is over. Safety is the major factor in planning a presidential trip, and the President has shown his usual sound judgment in choosing the airplane as his vehicle whenever possible."

Colonel Myers is quick to point out that responsibility for details of a flight, once scheduled, is his, not the President's.

"I name the take-off time, if consistent with the plans for the mission, or cancel the flight if necessary," he said. "It is my responsibility and my responsibility only, and neither the President nor his security officers have ever influenced my decisions by so much as a remark."

How does it feel to tell your commander-in-chief when and where he is to go?



Colonel Myers (a lieutenant colonel then) leans against the Cow. They have flown to 44 countries whose flags are shown.

PILOT. . .

By HAMILTON FREDERICKS

"I don't," Colonel Myers explains, "I simply call 'em as I see 'em and the President has always okayed what I decide. He has more common sense than any man I have ever met and everything works out fine."

But this is not to imply that Colonel Myers makes snap judgments or that trips are organized on the spur of the moment, as many news accounts have implied.

"The crew and I have plenty of things to worry about—the condition of the plane, weather, cargo and gas load," he explains, "but all these are complementary to safety. It should be added that safety is also at the top of the list with every airline crew. In other words, there's not much news in what we do."

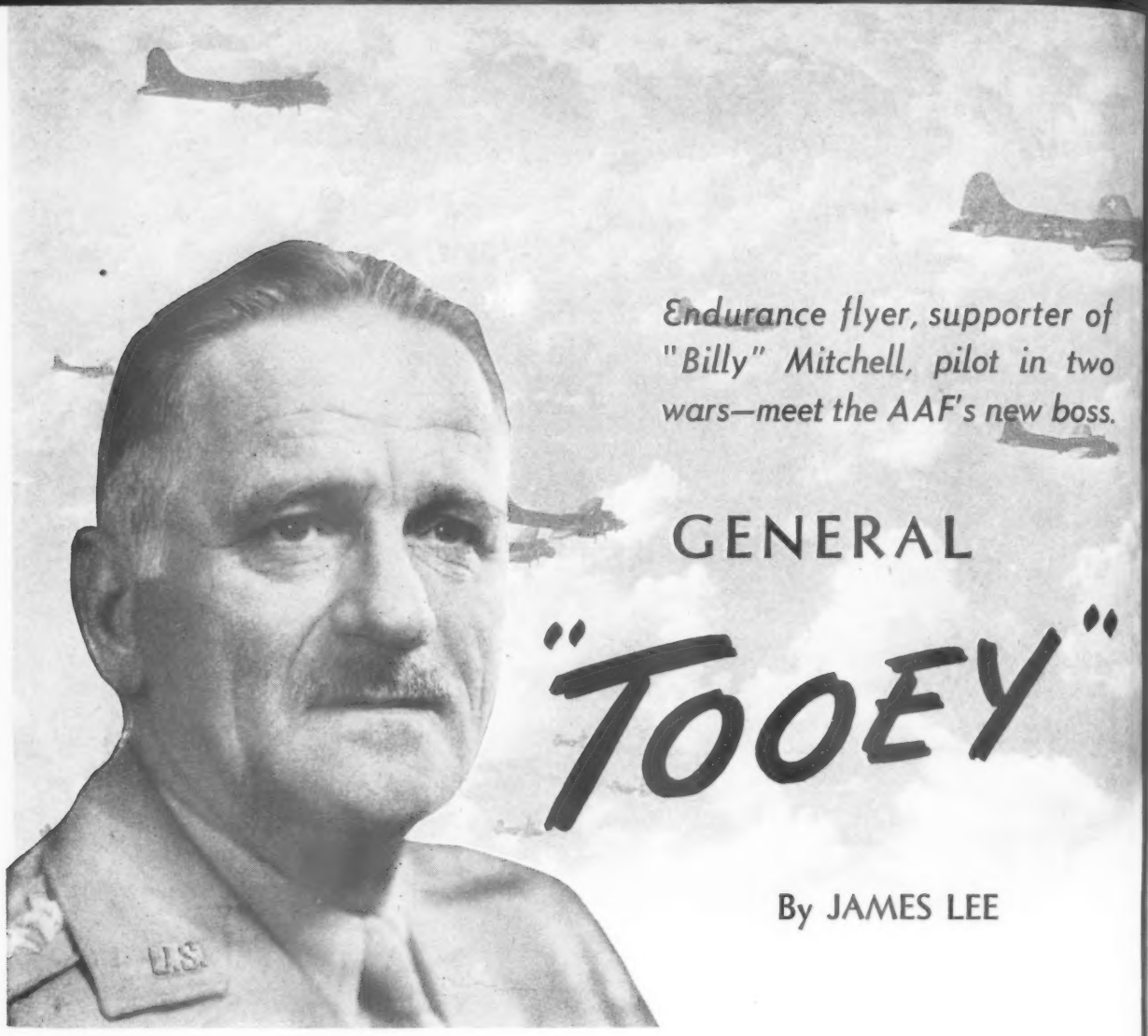
What about the fact that the *Sacred Cow* took off from Washington on Christmas Day when all the airlines were grounded and the accompanying plane, carrying newspapermen, did not take off until two hours later? And what about the return trip when the press plane, also a *Skymaster* was 3 hr. 26 min. behind the *Cow*?

"It was a matter of superior equipment and regulations on the part of the *Sacred Cow*, and a couple of bad breaks for the pilot of the press plane," Colonel Myers explained. "If the airlines had been flying DC-4s they undoubtedly would have taken off with us or even ahead of us. But, at that time, they were flying only DC-3s which could not take off in weather that a *Skymaster* can fly.

"As for the *Skymaster* press plane, (*Continued on page* 107)

Disney's proposed insignia for Sacred Cow wears a happy smile and has a halo.

Crew members prefer design by Ewin-Todd but fear it may be too undignified.



Endurance flyer, supporter of "Billy" Mitchell, pilot in two wars—meet the AAF's new boss.

GENERAL "TOOEY"

By JAMES LEE

"TOOEY" SPAATZ, who is now the commanding general of the Army Air Forces, is a pilot who never wanted to become a general.

Back in 1935, when he had been flying along contentedly as a major in grade for 15 years, the news was broken to Tooey that he had been tapped for the Command and General Staff School at Ft. Leavenworth, Kan. That's where the Army puts a shine on its brainy brethren destined to become high brass.

Spaatz's freckled face wrinkled with displeasure. "Who wants to be a general?" he asked of his flying mates. ". . . I've never seen a happy general yet."

As things turned out it was just as well the Army could see to it that Tooey became a general whether he wanted to be one or not. In his varied roles as Commanding General of the 8th Air Force, boss of the USAAF in North Africa, commander of the United States Strategic Air Force in the European Theater of Operations and finally as commanding general of the strategic air forces in the Pacific, Spaatz had about as much to do with final victory as any general in any army.

Tooey now holds military aviation's number one job, inheriting from "Hap" Arnold a command that must be kept in rhythm with the speed of sound, that must be cut to a pattern of electronic warfare. As he puts it:

"The air force of today is yesterday's air force but we must keep it in being until we have perfected the air force of tomorrow."

The sandy-haired Spaatz knows his job will be the toughest he has ever tackled. He didn't have to take it. To do so, he turned down a chance to run for governor of Pennsylvania. However, he's a pioneer who enjoys shooting at the moon and figures there never was a better time for blazing new sky trails than the present.

The job appeals to the Pennsylvania Dutch in Tooey as well as to the other elements of his not-very-complicated makeup.

Tooey—Gen. Carl Andrew Spaatz—was born June 28, 1891, in Boyerstown, Pa., a community which was famous chiefly for making caskets.

His name was spelled Spatz until 1937, when family influence resulted in the addition of an extra "a." This family influence was applied by his wife and three daughters, Katherine, Rebecca and Carla, who had grown weary of being called "Spats." Tooey told them amiably that they could do with the name as they chose, he'd string along.

The "Tooey" part of it derives from one of those West Point incidents which seem inexplicable to anyone but a West Pointer. When Spaatz was a plebe there was an upperclassman he resembled named Toohey—a slight, wiry, red-thatched, freckled-dotted lad. Spaatz's classmates jocularly began calling him "Toohey," the nickname soon was slurred to "Tooey" and there it stayed. He also, be it noted, was called "Red" and "Toughie"—a monicker he had carried ever since he was the lightest (120 pounds) halfback ever to tote the pigskin for Perkiomen Academy.

Spaatz was graduated from West Point as an infantry shavetail in 1914. He managed to make good his desire to become a flyer a year later when he was sent to the Signal Corps' aviation school in San Diego.

Tooey went to Mexico with Pershing in 1916 and flew the

Question Mark's crew, commanded by General (then Major) Spaatz (fourth from left) broke all world endurance records in 1929. Second from left is Lieut. (now Lieut. Gen.) Ira C. Eaker; second from right, Lieut. (now Maj. Gen.) Elwood R. Quesada. Below, at right, General Spaatz as a second lieutenant, stands before one plane that he flew during World War I.

sputtering crates of that era in a manner most annoying to the *mucho malo* bandits he was wont to shoot at with a pistol while roaring within spitting distance. Spaatz then as later wore a somewhat scraggly mustache which must have increased the bandits' terror.

He went overseas as a major in 1917 and became—although the official version probably neglects to mention—the first airman ever to win the Distinguished Service Cross while AWOL.

Spaatz had orders to return to the United States on temporary duty but the big show was on at Verdun and he wanted a part in it. He conveniently forgot the orders, took a plane up looking for a fight and ran into a whole covey of German bully boys.

He shot down two and in his enthusiasm didn't notice that he had run out of gasoline, had become separated from the rest of his patrol and was behind enemy lines. Calmly he started a long glide and just made it into friendly territory.

Back home after the war, Tooey displayed courage of another kind. He became a fervent disciple of the late Brig. Gen. "Billy" Mitchell when only a handful of Air Corps zealots dared to espouse the cause of that prophet of air power. When Mitchell was court martialed for insubordination in 1925, Spaatz was one of his witnesses—and that may have been one reason why Tooey remained a major for 15 years.

The general always has had a genuine dislike for publicity but at times he couldn't help making headlines.

On New Year's Day, 1929, he took the *Question Mark* aloft at the Los Angeles Municipal Airport in an endurance refueling flight. The airplane, breaking all (*Continued on page* 96)

THE *Voyager*

FLYING's TEST PILOT

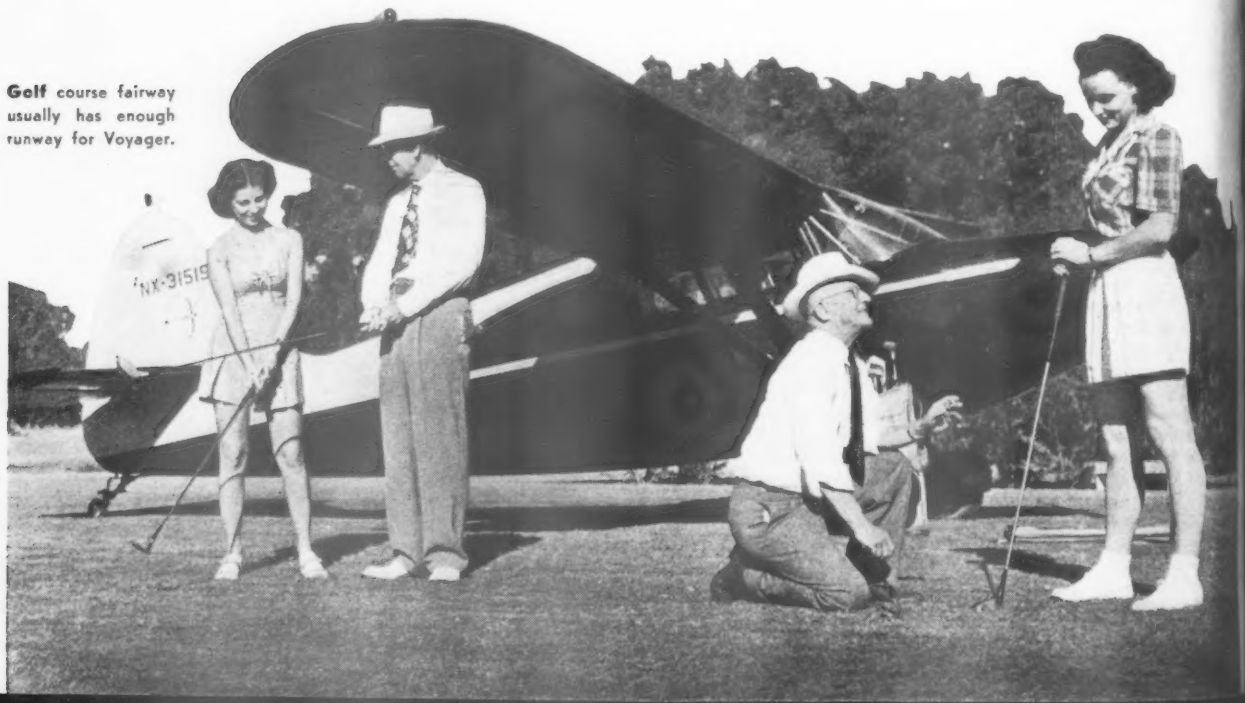
FOR the private pilot who can afford $5,225 for this four-place monoplane, the Stinson *Voyager* is one of the best airplanes in its class to be had today. That price, incidentally, is at the factory. The airplane I flew at Chicago cost $5,390.50 once the Illinois sales tax ($104.50) and delivery charge (Wayne, Mich., to Chicago: $61) were added.

Unfortunately, the day I flew the *Voyager* did not offer the best test-flying conditions. The surface wind was 25-30 m.p.h. with strong gusts. Rough air was encountered throughout the 1 hr. 31 min. flight. However, the *Voyager* used in the test gave an excellent account of itself.

In the discussion that follows, the reader must always bear in mind that it applies to the one specific airplane flown—NC-39443. It is obviously true of all types of planes that (*Continued on page* 104)

EDITOR'S NOTE

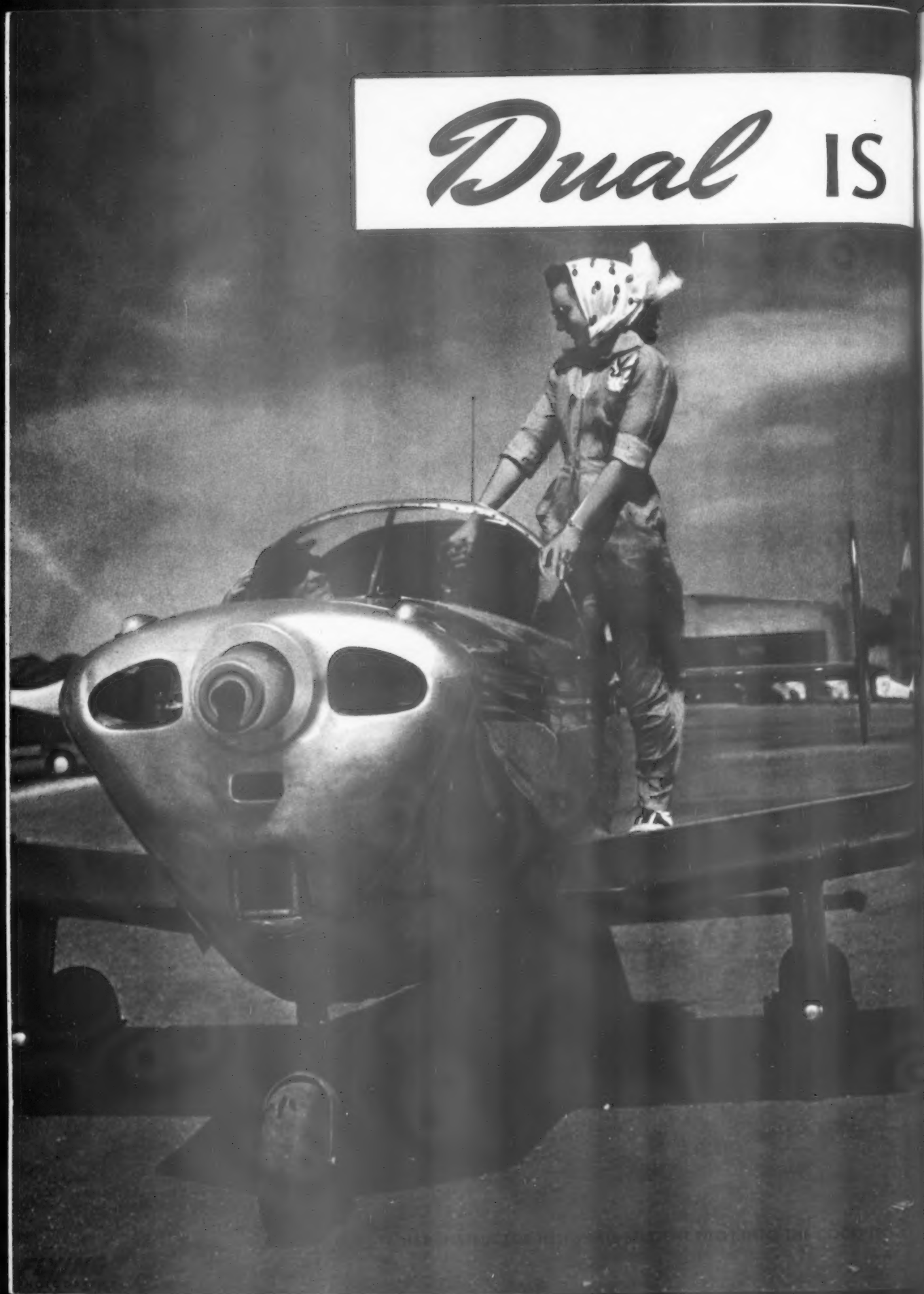
This is the first in a series of articles designed to aid the pilot and prospective airplane owner in deciding what type of plane he will buy. The manufacturer is involved in this feature only when he supplies the plane for the test flight. He has no control over what is said here.



Golf course fairway usually has enough runway for Voyager.

THE NEW SKYWAGER 150 IN FLIGHT OVER COLORADO

NC
24321
NC24321


Dual IS

INSURANCE

Dual time, says the author, is necessary for both veteran and novice pilot.

How long since you've had a check ride? No matter how many hours you've logged, occasional dual instruction can help you.

By ALBERT W. SPIERS, Jr.

Editor, Michigan City News-Dispatch

I HAD checked Jimmy Briggs, formerly of the Army Air Forces, through five more or less unnecessary landings in the surplus *Cornell*. Jimmy had flown *Liberators* overseas and had left service before getting back into anything as light and restless as the Fairchild.

Nevertheless, the old flying habits sledge-hammered into Jimmy in Army flying schools made me so much excess baggage as we ran through the check. Jimmy's flying was cool, precise and exact—his pattern a perfectly crabbed rectangle, his altitude rock-steady, his turns smooth, co-ordinated and graceful.

We taxied in and Jimmy's wife took my place in the back seat. Remembering the hard hours I'd taught in the Army, I felt a glow of pride as he took off solo. Our "kids" had learned their lessons well. They weren't forgetting the habits we so mercilessly drilled into their flying.

Joe, the operator, interrupted my reflection. "Stick around," he said. "I've got a fellow from out of town who wants to fly the *Cornell* just as soon as Jim gets back."

I was relaxing on a lazy Sunday at the airport. My business isn't flying—although I have a single and multi-engine commercial ticket with instrument and instructor ratings. Frequently I help Joe on week-ends, just to be flying, and take no pay except occasional solo time. I emphasize again that instructing is not my means of livelihood to strengthen a conviction I want to share with you—a conviction firmly cemented by the man I flew with after Jimmy.

He was about 35—stocky, intelligent, rather dynamic and impetuous. His logbook showed about 50 hours in a *Cornell*.

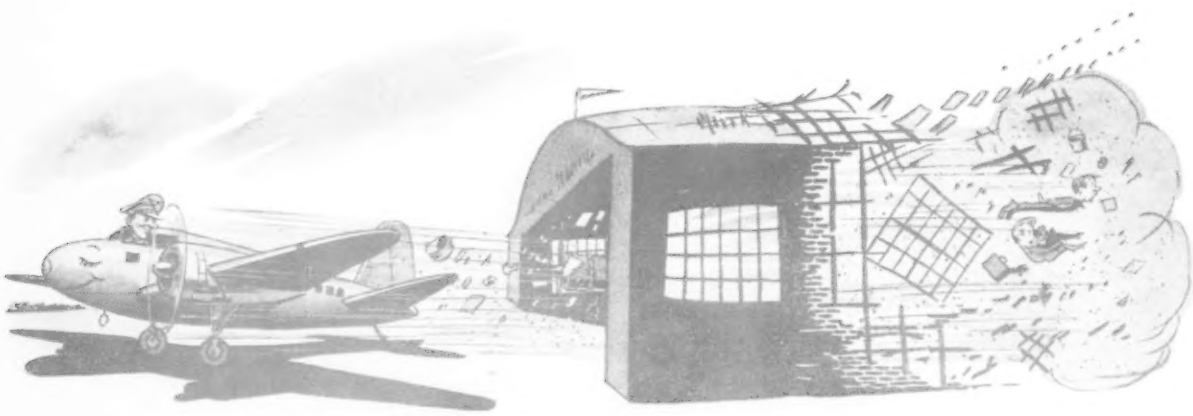
"I bought a surplus ship," he explained. "I've been soloed in it, of course."

I could see that in the logbook, but Joe insists that all pilots get a quick check before they solo his equipment. He's a wise operator as this cus- (*Continued on page* 90)

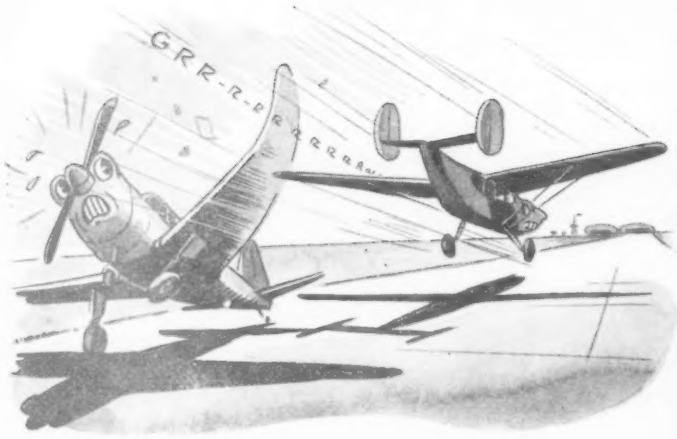
Circling field, the courteous pilot would not race for landing position or try to out-jockey other pilots into the base leg.

Pilots— MIND YOUR MANNERS

Courtesy in the sky means safety. Ignore it and your selfish manners may result in more accidents and stringent aerial laws.



Discourteous pilots often dusted author as he worked in hangar. He found that the best pilots were never to blame.



Wise-guy pilot, facing situation photoed at right, decides to show pilot on runway who's who. Instead of flying high over parked plane, he hedge-hops it.

MANY years ago I was flying at dusk over a dreary stretch of western terrain. The endless waste lands reaching to the horizons made me feel lonely and depressed.

Suddenly, I saw the running lights of another plane off to my left traveling in the opposite direction. When the other plane came opposite, he flashed his left landing light at me, and I flashed mine in return. It was only a small gesture, a way airmen have of saying "howdy," but it caused my spirits to rise so much that I finished my entire trip in a far more normal frame of mind.

In direct contrast to that incident was another that occurred a few nights ago. Coming down from Kansas City at about four a.m. I saw another plane off to my left and a little above me. When it was in such a position that the pilot was certain to see me, I flashed my lights at him. There was no response. I waited a few seconds then flashed them again. But the plane passed and disappeared in the darkness without responding. It may sound foolish, but the tempo of everything seemed to slow down; the lights on the ground below seemed dimmer; the rebuff actually made the lonely pre-dawn hours seem much longer.

The lack of response to greetings in the air; the aggressiveness of pilots when jockeying their planes into position around an airport; the coolness and aloofness between the different classes of pilots —military, commercial and private; all these practices indicate that we are leaving the era of courtesy in aviation. Maybe it's sheer sentimentalism to reminisce about the times when one nodded to his fellow airmen, dipped wings to him or let him land first if there was any doubt as to who was in the better position. On the other hand, we may be leaving that era to enter a cool, impersonal stage where it's every man for himself and the crash truck takes the hindmost.

By
HAROLD A. SHANKLIN
Braniff Airways Pilot

Because the number of pilots and aircraft has increased tremendously in the past few years, this transition from the personal to the impersonal might be considered a natural development. Certainly it is comparable to what has happened to the motorist.

Years ago, a motorist traveling the highways always waved to the occupants of a passing car. Many times the drivers would stop and talk. Today, when motorists pass each other, there is neither nod nor smile. Any waving is with a fist. Can aviation afford to come to that?

It takes no genius, no traffic expert, to ascertain that discourtesy of the road is directly responsible for thousands of deaths each year. The motorists who refuse to dim their bright lights, who fight for the right-of-way at intersections and who cut in front of other cars are simply showing lack of courtesy. Nearly all highway laws are merely enforced courtesy. Do away with all courtesy and you must choose between strict law enforcement or chaos.

Foolish as it seems, some airmen will take the get-the-hell-out-of-the-way attitude of some motorists. Being an airline pilot and flying into various fields where private, military and commercial traffic is encountered, I know from experience.

Recently I ran my engines up near the end of a runway, then was told by the control tower to taxi into position. I started out but had to stop when the tower advised me to hold my position as there was a lightplane without radio making a short approach.

I was in a bad spot. The front end of my airliner was out on the runway, but I couldn't turn it around and taxi off the runway as that would necessitate putting the whole plane in the other's way.

It was a situation that was no fault of my own. However, the pilot of the light-

(*Continued on page* 112)

WING ON A PIVOT

By DR. GEORGE SPRATT

Developer of Spratt Controllable Wing

Pivoted wing on Consolidated Vultee experimental plane completely controls the craft in flight.

THERE has been little more than 100 hours of actual flight experience with a controllable wing airplane, yet despite that brief period it is indisputable that an airplane can be controlled solely with a steering wheel and throttle with all the simplicity of an automobile or boat.

In this plane a landing approach can be made at constant speed. It is not necessary to nose down to change velocity. The pilot's calculations, therefore, can be surer. It is built in lighter weight than any previous type of aircraft—and at less cost. The wing is operated about a properly chosen axis in order to vary the amount and direction of lift sufficiently to afford all control necessary for flight stability.

The controllable wing plane has been proven but it will not reach ultimate perfection until further engineering development.

The Consolidated Vultee Aircraft Corporation is using a plane to test the Spratt controllable wing. The first such plane to make any great number of successful flights was developed and flown originally by me in 1934. This was the same year as the death of Dr. George Spratt, my father, who in 1908 built and flew a glider in which the wing was hinged independently of any frame work and controlled by a lever operated by the pilot. Only one crosswise hinge axis was used, parallel with the span of the wing. Lateral and directional control was given by rudder and ailerons.

The author has devoted years toward developing the controllable wing.

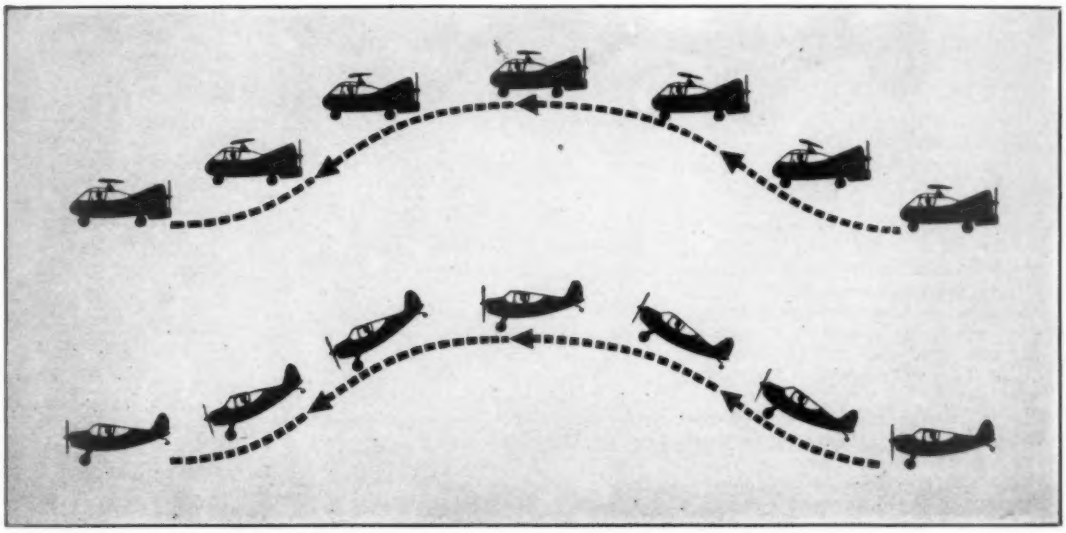
Earlier than this, Octave Chanute built and tested in 1900 a multi-winged glider on the shore of Lake Michigan. The wings were mounted on vertical pivots to swing horizontally so as to bring the center of pressure to coincide with the vertical line passing through the center of gravity. This was the first attempt to control a plane by moving the wings in respect to the c.g. of the craft, but the wings became warped after about 300 glides and the project was dropped.

Even before this, Percy Pilcher, in 1895, made a series of hundreds of glides, using a plane consisting of a light wing connected to a crude structure to support the pilot. The only flight control was the movement of the c.g. of the operator in respect to the wing. The pilot accomplished this by moving his legs, which dangled freely from the seat.

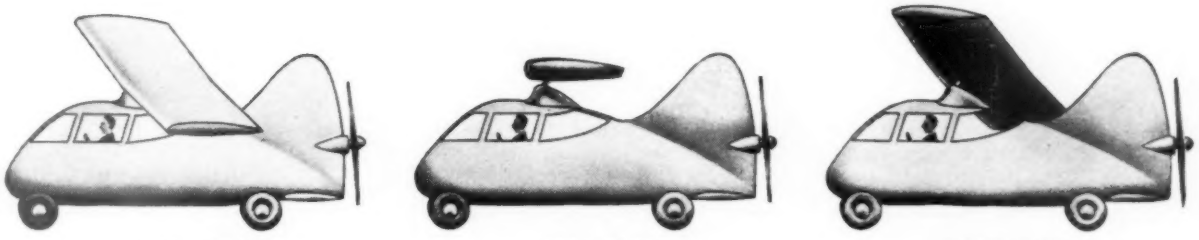
We know now that design of modern planes makes it impractical to move the c.g. in respect to the wing. The only alternative is moving the wing so as to change the direction of the force vector in respect to the c.g., or by using a movable wing.

Development of the Spratt controllable

No rudders, no ailerons, no elevators—the Spratt wing does the control job of all three. Here is its progress to date.



Controllable wing vs. conventional flight. Note how, in a climb, the entire conventional airplane changes its angle of flight while, with the controllable wing craft, only the wing angle changes. Illustrations below show how turns are made with controllable wing plane. Again, only the wing tilts, the fuselage remains level.



LEFT TURN STRAIGHT RIGHT TURN

wing was conducted between 1934 and 1937 with a landplane. At this time it was decided that more privacy could be given the project if the wing development were carried on with a flying boat. It was also a safety measure because take-off, flying and landing space was unlimited over water. We were somewhat afraid to fly a highly experimental plane over inhabited areas that did not afford good landing possibilities. Consequently, the wing was developed in comparative secrecy between 1937 and 1943.

The plane that Convair now is testing is the result of that work. The fuselage is similar in appearance and design to a streamlined automobile. The engine is rigidly mounted just behind the c.g. and the shaft passes up and back to a propeller at the rear of the car.

The landing gear consists of four wheels, all equipped with hydraulic brakes. Front wheels are independently sprung and the rear wheels interconnect through a torque tube to afford lateral stability on the ground.

The wing is connected to the steering wheel, so are the front wheels. When the steering wheel is turned, the front wheels and wing move simultaneously at the proper ratio, so that the flying and driving feel are similar, if not identical. It looks strange to an observer to see the wing move when the ship is steered on the ground, and equally strange, but considerably less noticeable, that the front wheels assume the ground steering position when the wing steers the plane in flight. The fact that the front wheels steer in the air has no appreciable effect on the flight of the airplane.

In the case of my flying boat, however, the assistance given by the wing to the water rudder on take-off, landing and taxiing and in maneuvering as a boat is very effective and essential in taxiing at high speed through congested or small areas.

A single wing is mounted directly over the c.g. of the car of the plane now under test. It is mounted in such a manner that it may be moved about two different axes which control the flight path. The directional control axis, or the axis about

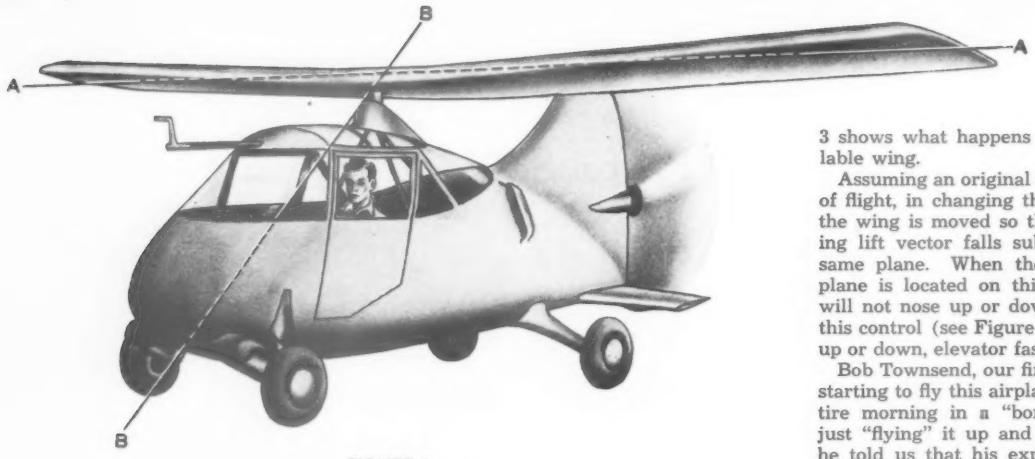


FIGURE 1.

which the wing is moved to control lateral direction of the plane in flight, is shown as "B-B" in Figure 1. This axis passes upward and rearward through the center of the span. Turning the steering wheel moves the wing about this axis in a manner similar to the way the front wheels of a car are moved about the king pin.

To understand just how this motion of the wing controls the airplane directionally, it is desirable to think of all the lift of the wing being concentrated in a single vector. This assumption may be made because the wing is one single unit, having no ailerons or vanes to change the position or slope of such a vector.

A simple demonstration of the control of this plane can be made with a model and a piece of string, shown in Figure 2.

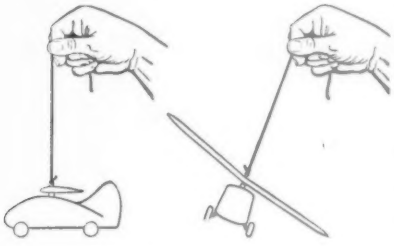


FIGURE 2.

The only requirement for this model is that it be directionally stable. That is, the c.g. must be ahead of the center of pressure on the sides of the car so that the car will always tend to point in the direction it is going, like a weather vane. The string is attached to the car at the hinge attachment of the wing, and when suspending the plane represents the lift vector. If the other end of the string is held in the hand, and the hand moved horizontally in a straight line, the model will go through the air in an attitude similar to flight. Should the hand be moved to one side or the other so as to execute a curve, the string is then sloped and the model will turn in proportion to the slope given the string and will bank in exact proportion to the turn executed. The string actually represents the flight vector, or line of force produced by the wing. When the wing is tilted this vector is also tilted, as is the string in the demonstration.

The longitudinal control axis, or the axis about which the wing is tilted to control the ship up and down, is parallel with the wing span and located just below the lower surface of the wing about 25 per cent of the way back from the leading edge. This axis is shown as line "A-A" in Figure 1. Moving the control wheel forward rotates the wing about this axis in such a way as to decrease the angle of attack and consequently decrease the lift. Moving the control wheel aft increases the angle of attack and, therefore, the lift.

The analogy of this control may be shown with the same model and string. If the model is supported by the string, the tension in the string will exactly equal the weight of the plane. Should the tension in the string be increased, all the force greater than the weight of the ship will cause an upward acceleration. Conversely, if the pull of gravity is greater than the pull of the string the ship will be accelerated downward. Comparing our single flight vector in the airplane to the string on the model, it is evident that *all that is needed for longitudinal control is to change the force of this flight vector without necessarily changing its direction.*

The simplified vector diagram in Figure 3 shows how this is done. The short ar-

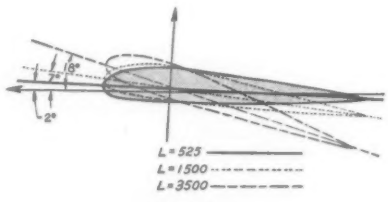


FIGURE 3.

rows represent the direction of air flow striking the airfoil at 100 m.p.h. velocity. The correspondingly indicated vertical arrows represent the amount of lift and its direction relative to the chord. Figure 3 shows what happens with the controllable wing.

Assuming an original constant direction of flight, in changing the angle of attack the wing is moved so that each succeeding lift vector falls substantially in the same plane. When the c.g. of the airplane is located on this plane, the ship will not nose up or down in response to this control (see Figure 4), but simply go up or down, elevator fashion.

Bob Townsend, our first test pilot, after starting to fly this airplane, spent one entire morning in a "borrowed" elevator, just "flying" it up and down. Later on he told us that his experience with the elevator did more good than his previous experience with airplanes!

Speeds below 84 m.p.h. tend to tilt the wing down; speeds above 84 m.p.h. tend

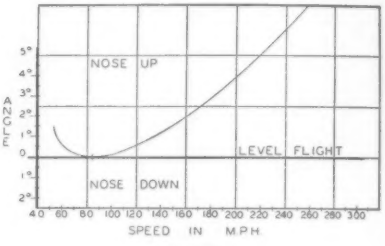


FIGURE 4.

to tilt it up. The distance from the pivot to the vector increases at a progressively higher rate with increasing speed. This gives stability of a high order, as this

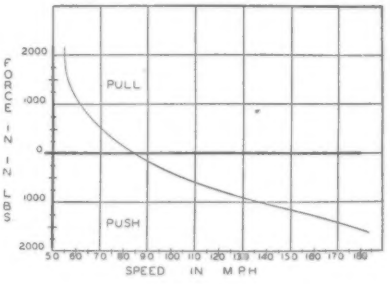


FIGURE 5.

curve of the speed plotted against the torque shows (Figure 5).

Relative merits of two- and three-control planes have been discussed and argued throughout the industry for years. But why not consider a *single* control plane?

From a broad viewpoint the two-control airplane might be deemed a single control—assuming the fore and aft motion of the stick to be just a speed control. Only the throttle makes the plane continue to go up or down.

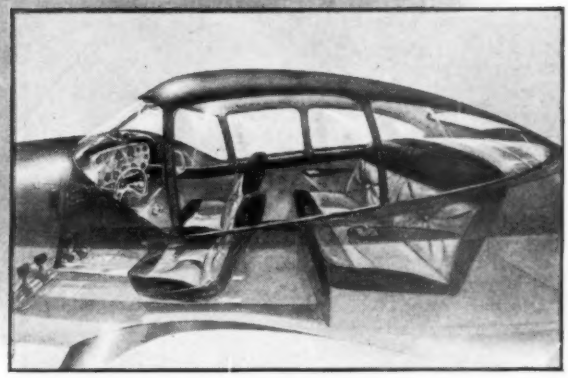
With a longitudinal control having plenty of stability and speed of response, such as the controllable wing, the function performed by the fore and aft motion of the control wheel could well be

(*Continued on page* 112)

NORTH AMERICAN'S *Family Plane*

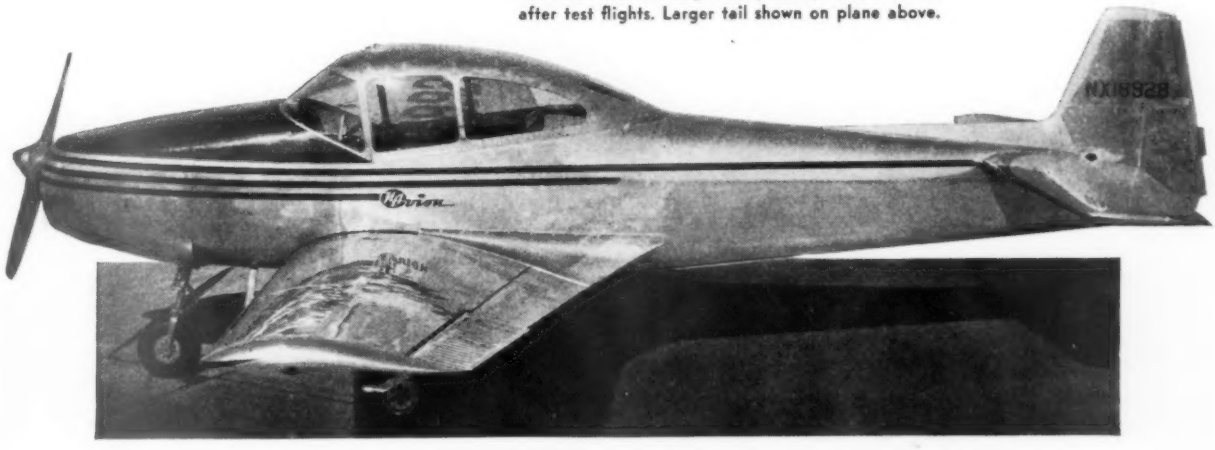
Navion's squarish appearance shows the strong influence of Mustang designers.

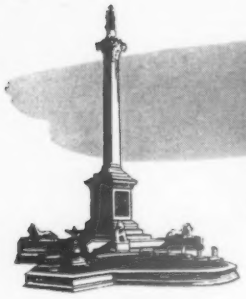
THIS is the long-awaited North American entry into the personal-plane market. Named the *Navion* ("I'd call it the *Colt*, in memory of my *Mustang*," an AAF fighter pilot said), it has a 185-h.p. Continental engine, retractable tricycle gear, and flaps. It will carry four persons 580 miles at a cruising speed of 150 m.p.h. It will climb 830 f.p.m. and land at 54 m.p.h. Span is 33 ft. 5 in., length, 27 ft. 7 in. Gross weight is 2,576 pounds, wing loading 14 lb. sq. ft. Still experimental, final *Navion* will sell in $4,000 to $6,200 airplane class.



Interior is much like that of an automobile. Canopy aft of windshield slides back to make passenger entrance.

Smaller tail and larger fin (below) were installed after test flights. Larger tail shown on plane above.





London Letter

By Maj. OLIVER STEWART

British Authority, Editor of Aeronautics

THE Miles Aircraft Company of Reading, near London, has done something to relieve the depression created in Britain by the February announcement of new French personal aircraft designs.

Those who want to fly their own aircraft over here were getting increasingly restive as specifications of the pleasant-looking little Morane-Saulnier 560, the S.U.C. 10 twin-boom aircraft and the S.E. 2,300 with the Renault *Bengali* engine came in from across the Channel.

It began to seem as if no British manufacturer was interested any longer in small personal aircraft. Then came the demonstration of the Miles *Gemini*. Spirits rose for the *Gemini* has all the marks of a first-class, personal machine.

With two Cirrus *Minor* engines, a maximum speed of 150 m.p.h., six hours cruising duration and good single-engined performance, the *Gemini* is likely to gain popularity. The price of £3,500 ($14,000) looks high until it is compared with the prices for other things, such as motor cars, in Britain at the present time. If £350 ($1,400) or £400 ($1,600) is a fair price for an eight-h.p. motor car, no one can grumble at £3,500 for a twin-engined aircraft.

People

Resignations often reveal the emotional undercurrents of an industry. We have had two resignations in Britain recently which have caused a stir. They were of men of entirely dissimilar types: Gen. A. C. Critchley, chief executive of British Overseas Airways, and Air Comm. Frank Whittle, inventor of the jet engine for aircraft.

Critchley wrote a long letter to Minister of Civil Aviation, Lord Winster, about his reasons for resigning, but the general inference was that he did not like the prospect of state-owned and state-run airlines. Critchley has always been a vigorous individualist and having to bow to the wishes of a minister would not be likely to suit him.

State control is also involved in the Whittle resignation, as Power Jets, Ltd. is a state concern. However, it was a state concern when Whittle accepted his appointment with it.

The state will still have a call on Whittle's brain through the RAF; otherwise his departure from Power Jets, which is to be the main government research organization in this field, would have been more serious.

Whittle is a strange personality, for his technical skill and inventive brilliance accompany a high manual dexterity. He was a really first-class pilot and still flies well.

Athodyds

People in Britain were inclined to be skeptical about the value of the athodyd for launching gliders and for general auxiliary power unit work until tall, scientific Dr. S. G. Hooker, chief jet engineer of Rolls-Royce Ltd., referred to it in a paper read before the Royal Society of Arts.

Dr. Hooker, revealing that the delightful name "athodyd" came somehow from "Aero Thermo Dynamic Duct," referred to it as the simplest power unit. It seems to be even simpler than the German impulse duct engine fitted to the V-1 flying bombs as the athodyd has no shutter arrangement at the front end.

And it shares with the German device the distinction of having no rotating parts. It must be the first and only prime mover without either rotating or reciprocating parts. Dr. Hooker, in the same series of papers, also referred optimistically to the possibilities of using atomic energy for aircraft, a thing about which most men of science have been extremely shy.

A, B and C

Fifteen different aircrew licenses are to come into force in Britain. The private pilot or club flyer will still hold an A license, but when he is under instruction he will hold the new "pupil pilot" license.

Formerly the B license covered all commercial work as the title of "Master Pilot" was mainly an honorary distinction invented and conferred by Imperial Airways, the forerunner of British Overseas Airways. Now, however, the C license will be for airline work.

Glider pilots' licenses are in A and B categories. The A license is for sport and private gliding and soaring and the B for commercial. The other licenses are for navigators, radio operators and flight engineers. There also are two ground engineers' licenses.

Shows

Delegates to the conference of the UNO in London had one of their Sundays enlivened by a more than ordinarily hair-raising display of aerobatics in a de Havilland *Vampire* by young Geoffrey de Havilland, son of the founder of the firm.

De Havilland has devised an aerobatic performance which, even to old hands, is startling. He throws the *Vampire* about like a juggler and at Hatfield, where the UNO show was held, he made full use of the aircraft's enormous speed range.

I have been interested in aerobatics since the early days and used to specialize in them myself. I watched Pegoud, Hucks, Udet and Fieseler, but nothing I have seen excels these de Havilland shows.

Another kind of show is the exhibition of German aeronautical developments at the Science Museum in London. This is an echo of the Royal Aircraft Establishment exhibition of last year in which about 30 types of aircraft were included.

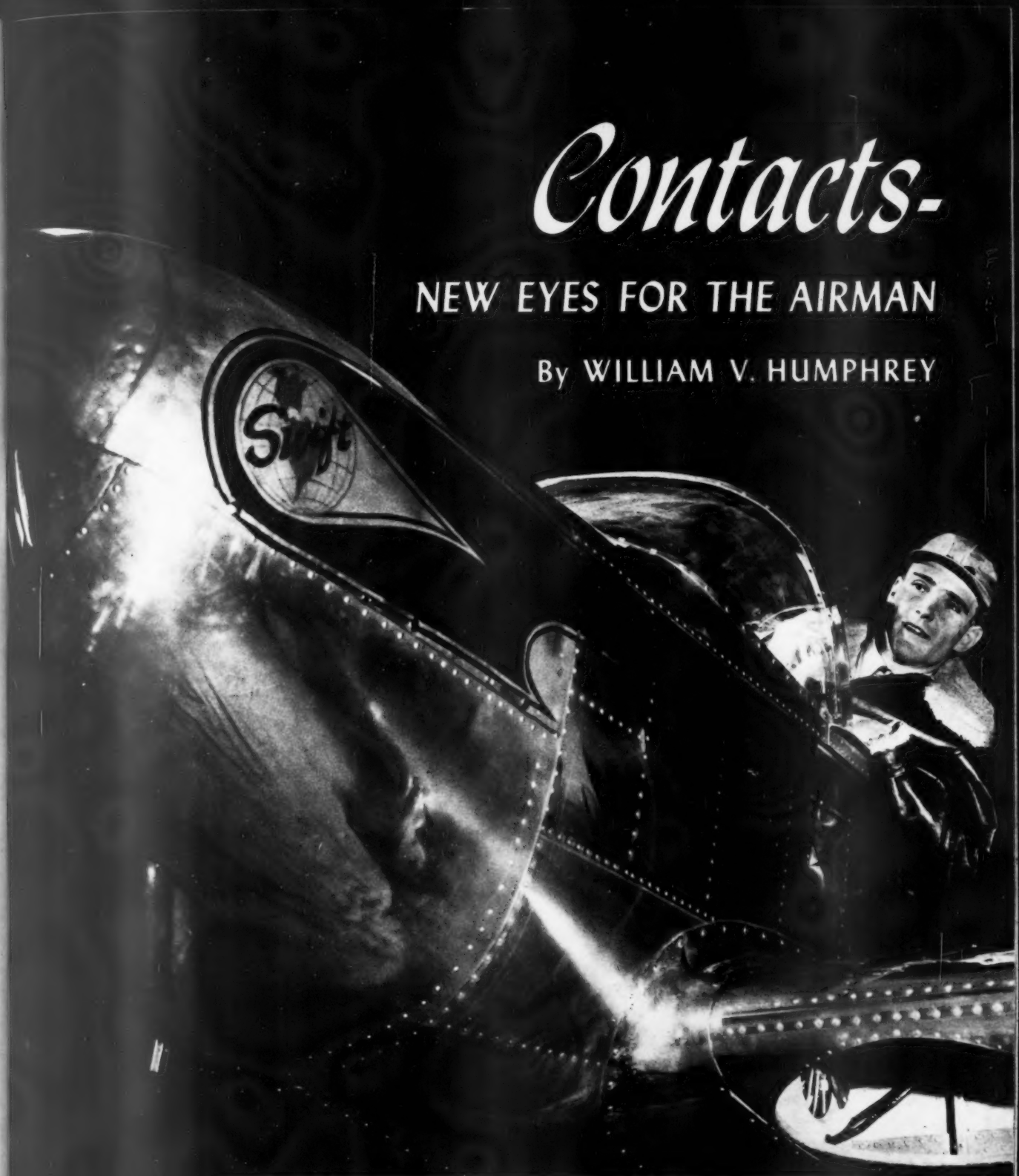
Critics said at the time that Farnborough was too difficult to get at to enable all who were interested to make a thorough study of German developments. The Ministry of Aircraft Production had the good sense to listen to the critics and to stage this fresh exhibition in London. Some were surprised to see a German gyroscopic gun sight for fighters. There had been an impression that only the Allies had such an instrument. END

The Gemini, Miles Aircraft's personal plane, is equipped with Cirrus *Minor* engines, has a maximum speed of 150 m.p.h., six hours cruising duration. Price, £3,500 ($14,000).

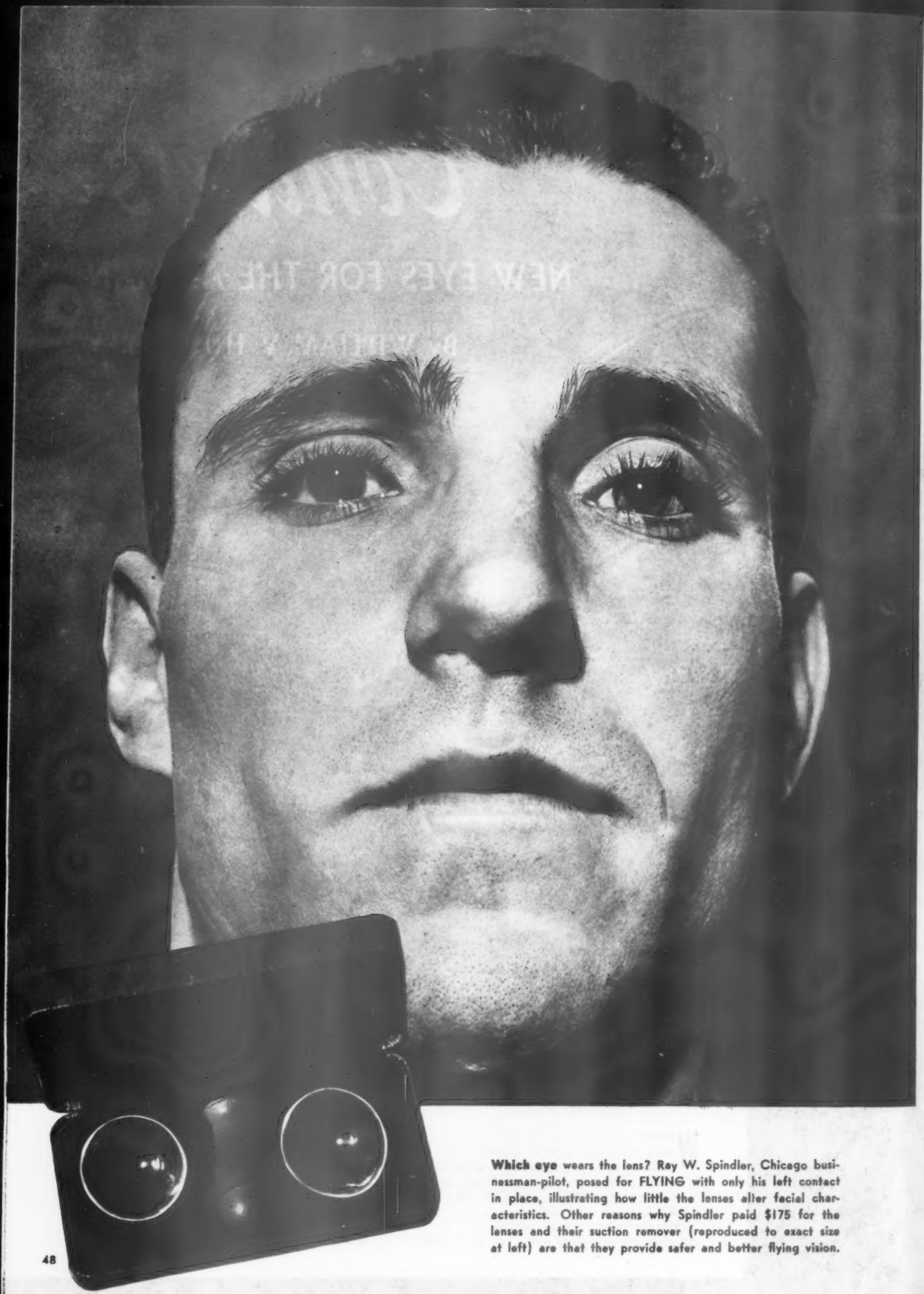
Contacts-

NEW EYES FOR THE AIRMAN

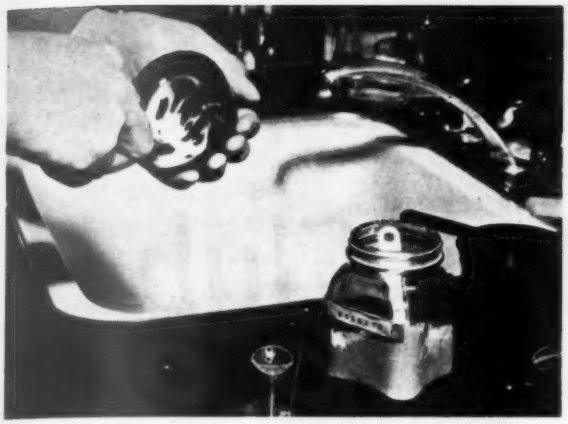
By WILLIAM V. HUMPHREY



WHERE flying fitness is concerned, the eyes have it. Pilots in our armed forces must pass tests for normal vision without artificial aids. And even the lightplane pilot must have eyes that can be corrected to a degree that closely approximates such normalcy. Until recently, the only corrective device used in meeting sight requirements was a pair of spectacles. But "specs" leave much to be desired when used by the flyer. They can be torn off in a slipstream; they become bespattered in rain or clouded in sudden temperature changes. Because contact lenses go far toward eliminating these and many similar visual problems, they actually are "new eyes for the airman." Acceptance and use of the new lens, which fits

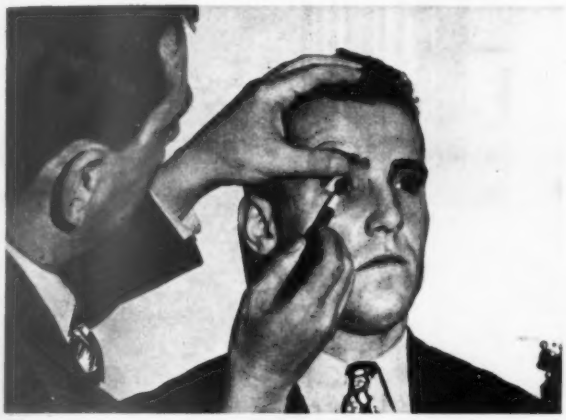


Which eye wears the lens? Ray W. Spindler, Chicago businessman-pilot, posed for FLYING with only his left contact in place, illustrating how little the lenses alter facial characteristics. Other reasons why Spindler paid $175 for the lenses and their suction remover (reproduced to exact size at left) are that they provide safer and better flying vision.



First step in lens making—alginate compound is mixed for use in perforated eye-cup to take impressions of the eye.

Impression is made in two or three minutes. Lower eyelid is taped down, upper one held firmly. No anesthetic is required.



Corrections are penciled directly on the plastic lens that has been molded to conform to alginate "cast" of the eye.

Dental lathe is used for final polishing. Lens is ground so as to clear the cornea, the part of eye that appears colored.

Result is a new set of eyes that are accurate, that are not irritated by smoke, and will not cloud in temperature changes.

directly over the eye and becomes essentially an integral part of one's visual apparatus, is not restricted to the flying enthusiast. Some 2,500 contact lenses are now being produced monthly. This steady increase in usage, despite the fact that their cost per pair usually exceeds $100 plus $25 to $75 in optometric fees, means that increasing numbers of people are finding contacts a more satisfactory visual aid than ordinary eyeglasses. Noteworthy benefits of contacts, however, still accrue most directly to the man with poor eyes who wants to fly.

There are many abnormalities of vision. Those that can most commonly be corrected to meet the requirements for civilian flying are nearsightedness, shortsightedness, farsightedness, and astigmatism (the inability to focus the eyes because of irregular curvatures of their front surfaces). Improvement of these conditions afforded by ordinary glasses is often slight—many times resulting in no better than 20/200, or 20 per cent vision. It is little short of amazing, therefore, that with contact lenses visual acuity that has been impaired by the foregoing conditions, can be increased to 20/30 (85 per cent), 20/20 (normal, or 100 per cent), or even to 20/15 (better than normal) vision. [If an observer can just distinguish (*Continued on page* 86)

Pilots' Country Club

Marvin Whiteman's pioneering airpark will offer club privileges to its flying patrons

IN THE San Fernando Valley, about 20 miles northwest of downtown Los Angeles, is Whiteman Airpark, a combination lightplane haven and pilots' country club. Marvin Whiteman, a longtime pilot and aviation enthusiast, tagged around the country for years, observing airport operations before he started his airpark on a 64-acre field last June. In the few months since, operations have reached maximum capacity. Eighty-two planes are based on the field; 23 of them belong to Whiteman. Monthly hangar rent is $35; tie-down rates are $15 per month. In the first seven months of operations the airpark soloed 180 students and had 50 students obtain private licenses. Among plane owners at the base are Edgar Bergen, Gene Autry, Ken Murray and Robert Cummings. On an adjoining 13-acre section, Whiteman plans to build an air hotel and a swimming pool. A clubhouse will be built and pilots using the field will be permitted to enjoy full club privileges.

WHITEMAN AIRPARK—
PLEASURE PORT FOR PILOTS

Pilot's view of the airpark (left) shows its 3,200-foot macadamized landing strip. Temporary headquarters (above) are to be replaced by a hotel and clubhouse. Group at right includes Whiteman (left), Chief Instructor H. T. Childers (center) and Bernie LaBarr, airport manager (right).

The Treetop Line

The tiniest hamlet in any remote corner of the United States now can have commercial air service.

By MAX KARANT
Managing Editor, FLYING

HERE is an airline that can operate regular schedules through your back yard, no matter where it is. And if the 40-odd companies who have applied to the CAB for certificates for such lines are approved, you may already have an air mail pickup service scheduled for your yard and not know it. The chances are, at least, that one of those companies may use the empty lot across the street.

The whole thing started back in 1939 when All American Aviation, Inc., flew its first schedule out of Pittsburgh. Of course, all the experts at the time branded the idea as a screwball operation that would end up within a few weeks or months with its low-flying airplanes scattered all over Pennsylvania. Such predictions are almost a sure sign that the idea has merit. Here's what happened:

1. The experimental air mail operations (no passengers yet, but they'll be carried in larger pickup planes before long) did well and expanded through the hill country of Pennsylvania, New York, West Virginia and Ohio—some of the worst country in the United States for that kind of flying.

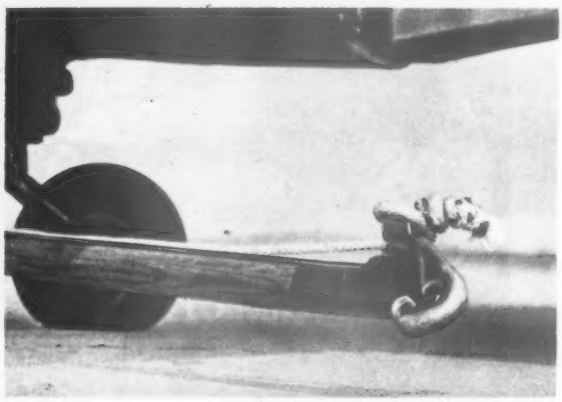
2. To date, this "treetop airline" has proved to be one of the safest in the world, despite the fact that AAA planes complete schedules without a hitch when all the domestic airlines are grounded by bad weather.

3. The pickup equipment developed and perfected for the

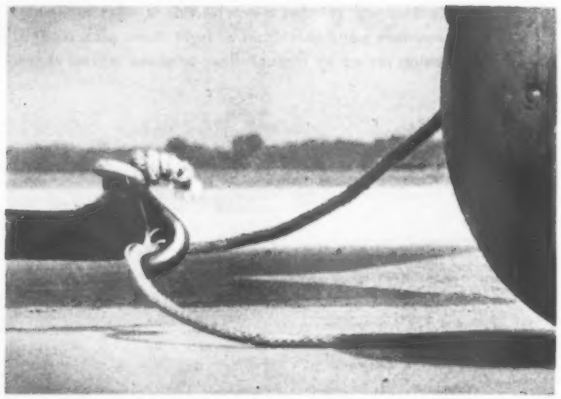
Flying low, the All American pilot aims his Stinson at the line stretched between the poles. Actual pick-up is made at 110 m.p.h. Man at right is mail carrier who sets up equipment and handles plane's mail.

Pickup is made a split second after delivery pouch is dropped (circled below). This is what mailman on opposite page sees. Inset at right shows pickup canister being reeled up through floor as plane crosses railyard.

THIS EQUIPMENT MAKES PICKUPS POSSIBLE



Plane's hook slides off end of pole when pouch is picked up. Hook is replaced for next pickup by sliding pouch down pole.



Mail pouch is hooked like this. Maximum pickup is 50 pounds, maximum drop load, 84 pounds. Limits are being increased.

Electric winch in cabin reels loads in and out of plane. It is same idea on which AAF glider pickup system is patterned.

Knife blades cut nylon rope if it becomes tangled on plane's gear during pickup. AAA has an excellent safety record.

All American operations proved to be one of the most useful new inventions used in the Army's air war around the world. The glider pickup, now regarded as commonplace, is fundamentally the same gadget that's still picking up the mail sacks out in the Allegheny Mountains. Modifications of the glider pickup have been used to pick up stranded military planes, snatch human beings out of an impassable jungle, and even to hook a tow onto an airplane whose engine failed but was still gliding.

Yet, this pickup idea today has only tapped the smallest fraction of its ultimate possibilities. It's a foregone conclusion that the tiniest American communities, if they can support it with the necessary volume of business, will have several-times-daily air mail service. There is at least one town on the original All American route in West Virginia that has had twice-daily air mail service since 1939—but does not yet even have a single railroad track running through it.

A flight over an All American route, in the co-pilot's seat of an AAA Stinson, is an eye-opening experience. To the experienced flyer or air traveler the most unusual and startling part of the operation, of course, is the actual pickup, made within a few feet of the ground and at 110 m.p.h.

Ground equipment necessary for a pickup operation at a town includes the two portable poles, nylon lines and the pouches. When not in use, the poles and lines are taken apart and stored, usually in a padlocked box permanently mounted at the site where pickups are made. When needed, the equipment is set up in a few minutes by whoever has been designated by the postmaster (*Continued on page* 122)

Report from Washington

By FRED HAMLIN

A RUMOR'S been going around Washington that the Army Air Forces offered the Civil Aeronautics Administration a number of GCA (Ground Controlled Approach) systems, with personnel to handle them—and that CAA turned the offer down. We've checked up and found there are two sides . . . CAA says yes, they turned down all but one of the units and that they will also turn down a brace of elephants if offered. The one unit they did accept came without personnel and with AAF's request that the GCA be guarded at all times. CAA put the unit out to pasture at their Indianapolis laboratory and finally fired the men guarding it to hire one engineer to see what makes it tick . . .

From all this it may be gathered that CAA is not pro-GCA. That's right. The Administration's stand is that with GCA, as with elephants, it's not the cost but the upkeep. It took 16 men to operate one unit in the AAF during the war which, even if reduced greatly, would still be too many. Only a repairman is needed for current CAA landing equipment. Best peacetime use for GCA, CAA thinks, would be to get wandering lightplanes out of soupy weather. Officials contend that few such planes wander and they shouldn't . . . Meantime, they stand on their present instrument landing equipment which they say is okay with the airlines, for whom it was built, and was so okay with the AAF and Navy during the war that both used it all around the world.

They would welcome the opportunity to research in the field of all-weather flying for private planes, but the Bureau of the Budget recently reduced an appropriation of $1,000,000 for that purpose to zero. Technical development appropriations were cut $780,000 at the same time . . .

Pilot Peeve

Reason we got so interested in this GCA business is that we've been getting a lot of mail complaining about CAA's attitude toward lightplane instrument landings. Pilots say CAA talks a great game about helping the private pilot toward all-weather flying but in practice continues to thump the tub for its own system, adequate for the airlines but prohibitive for the lightplane because of weight and cost factors . . . While not holding up GCA as the final salvation for the lightplane pilot, the lightplane boys feel that at least it is a step in the right direction and that some of the money spent by CAA on instrument landing systems should be directed toward the lightplane instead of all of it toward the airlines, as is the case today.

"GCA offers no extra weight, no extra expenditures," says one private pilot, "and for the civvie pilot that means a lot unless he's in the chips—and who is?" "Replacing the CAA system by GCA would be one of the biggest contributions to private flying," says another, who is both a pilot and a control tower operator. A third sums up the advantages, to amateur pilots, of the GCA: "I have had some experience as an Army instrument flight instructor," he says, "and there is no question that the CAA localizer-glidepath method requires a far higher degree of pilot proficiency. Airline pilots can easily adapt themselves to it but for the private pilot who makes an instrument let-down only occasionally, the CAA method is virtually useless. GCA, on the other hand, requires that the pilot concentrate on precisely the points which have been drilled into his head in the course of his instrument instruction."

Forgotten Man

Pilots of lightplanes who have followed the situation feel that they are the forgotten men so far as instrument landing is concerned. To CAA's contention that no lightplane pilot should be in the air in dirty weather, they raise the question—if nothing is done toward eliminating weather as a handicap to private flying, how is the mass flying CAA so sanguinely predicts going to come about? . . . Another point: CAA's system does require personnel, since it involves seven ground installations, all geographically separated and all supposed to operate at once. These are the outer, inner, and boundary markers, the glide path, the runway localizer, and two compass locater stations. Also, GCA does two jobs—instrument approach plus surveillance of 2,800 square miles of air—while CAA's system does only one.

Besides, the new GCA equipment can be operated by one man. Further, CAA's system is *not* an instrument landing system, it's only a low approach system. And still further, the Army *did* offer to furnish crews with equipment. Why, therefore, should CAA turn GCA down—specially with Army equipped with 200 of them, all ready for operation—or for deterioration into some very expensive junk? After all, doesn't the private pilot represent more of the public than the airlines? . . . What the outcome of the debate will be is unpredictable but we can report that latest word tells of tests comparing GCA and CAA's system at CAA's Indianapolis laboratory, with experts on both sides presenting their case. All we can add is, we hope somebody wins. In the course of writing these few words on the subject of instrument landings, we nearly had our ears pretzeled by radio engineers.

War Birds

Military craft are still improving despite cessation of hostilities. We learn, for instance, that the Boeing XF8B-1 has made a speed run of 518 m.p.h., with the pilot stating that he still had a little to spare on the throttle. The plane has 13½-foot contra-rotating props driven by the 28-cylinder Pratt & Whitney 3,500-h.p. *Wasp Major*. It can carry a bomb load of 6,400 pounds, or two 2,000-pound torpedoes, and has six 20-mm. cannon or six 50-caliber machine guns in the wings . . .

Speaking of speed, we hear that Herm ("Fish") Salmon, chief engineering-research test pilot for Lockheed, recently completed a series of dive tests on the *Shooting Star* in which he went so fast that he peeled the paint off the wings . . .

The Republic XP-84, a new jet fighter, was recently crated and flown to Muroc Dry Lake in a Boeing *Stratocruiser* (C-97) for tests. (See photo on page 72)

Shows

Harbingers of post-war private flying are shows planned for 1946 at which lightplanes will have the spotlight. The Aircraft Industries Association leads with two—one on the east coast, one west, neither definitely scheduled as we go to press, both big with promise. It is planned that these will develop for aviation what the big fall automobile show in New York is for that industry. Fall dates are planned . . . Some 1947 models are also expected to show at a big midwest to-do called the "World's Fair of Aviation," July 18-21, at Omaha, described modestly by its backers as "the first post-war inter-

(*Continued on page* 117)

NEBRASKA'S AIRPORT BOOM

Wayne airport has four sod runways with revenue-producing alfalfa between strips. Small building in foreground is clubhouse.

By LAWRENCE YOUNGMAN

Aviation Editor of Omaha World-Herald

NEW airports are popping up all over Nebraska these days for Nebraska's wide-open spaces are perfect for flying. Few Nebraska cities in the 3,000 to 10,000 population group either are without an airport or the plans to build one. Airport development is now underway at 69 different places.

The reason for all this expansion is an air-minded citizenry and a State Aeronautics Commission quick to dip into the treasury in support of any reasonable request.

Communities of all sizes want airports. During a recent month four cities—populations ranging from 865 to 2,220—wanted flying fields and floated bond issues ranging from $10,000 to $35,000. Twenty-five communities are engaged in airport promotion and development and many more are organizing drives for hometown landing fields.

The communities are raising the money themselves but the State Aeronautics Commission and the Nebraska State Department of Aeronautics also are offering aid. Each month about $11,000 comes into the department's treasury from a five-cent tax on aviation gasoline. Because of the war and the resulting small demand for airport aid, the treasury now has $361,000 of which $221,000 already has been earmarked for various aviation purposes.

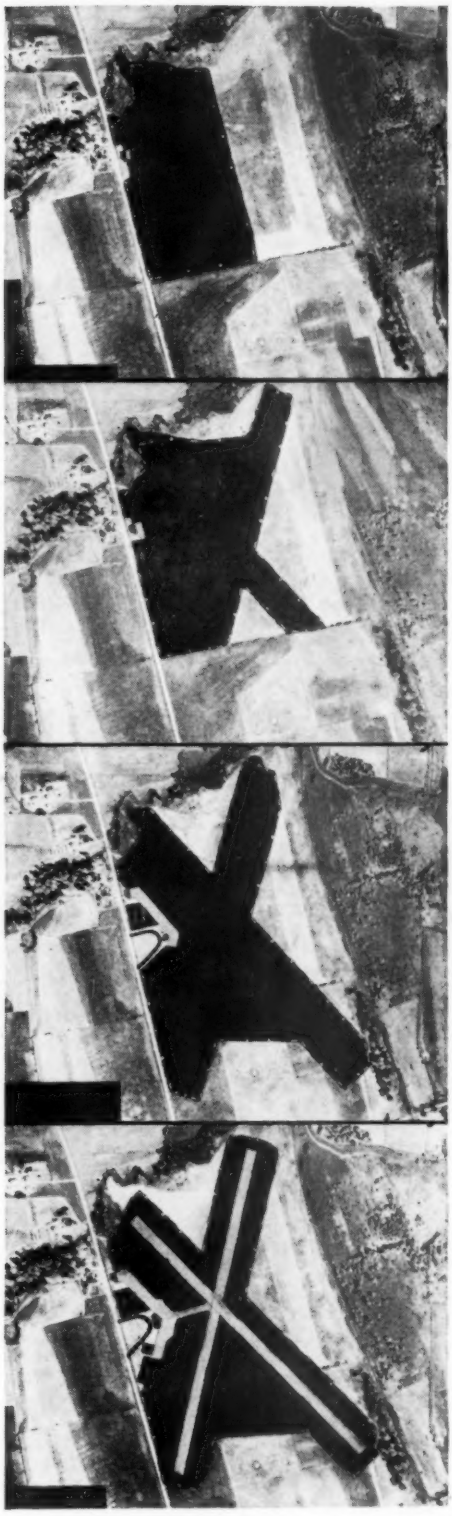
Obviously the Department of Aeronautics isn't rich but the Aeronautics Commission which controls expenditures has proven that a little money can go a long ways in developing the small airport. Often a few hundred dollars will carry an airport's sponsors over a tight spot and give them the confidence they need. It is the commission's policy never to refuse at least token financial aid to all reasonable community requests.

"Of course we can't provide all the money that communities

Blair Airport Development Plan

Aided by the state's aeronautics commission, 69 small towns have started to build airports.

Blair airport has gasoline pits and remotely-controlled automatic pumps.



Four-stage plan of CAA is being followed carefully. Top to bottom: original all-way turf field; present second stage with two turf landing strips; proposed third stage with three turf landing strips; fourth stage, which would have paved runways.

ask for," says Commissioner Max Kier of Lincoln, Neb., "but if the community can present a reasonably good case, chances are that it won't go away empty-handed. In the past, we usually have been able to help the communities over their worst hurdles."

Now, with an expected boom in Nebraska airport construction, the commission's help may not be as generous as before because the money will have to be spread a great deal thinner than heretofore.

When the community owns the land on which an airport is situated, the commission is willing to help on almost any type of permanent improvement, from grading and seeding to installing a water system. However, it prefers not to finance revenue-producing improvements such as hangars which should be self-financing. For com- (*Continued on page* 100)

Figure 1. Annesley propeller is controlled by a push-pull cable from cockpit to actuator.

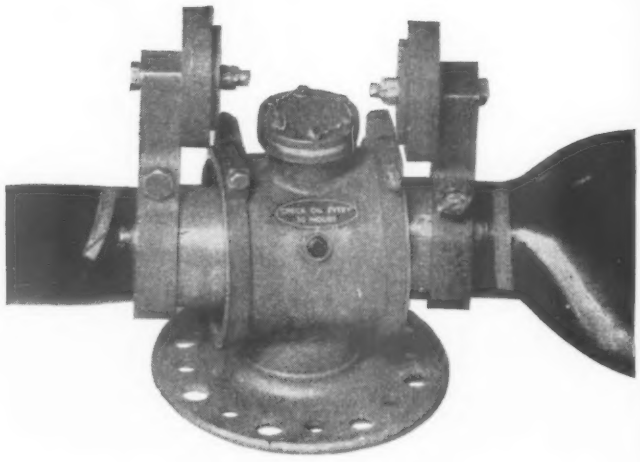


Figure 2. Aeromatic propeller uses thrust and centrifugal force to change pitch of propeller blades automatically. For each successive stage of forward speed, the blades automatically assume correct angle.

VARIABLE PITCH:
The Lightplane's Gearshift

ANY pilot who has had the uncomfortable sensation of end-of-the-field trees tickling his plane's landing gear, or who has tried to gain altitude rapidly when someone was taking off under him, will listen readily to anyone who has a lightplane variable-pitch propeller to sell. So will pilots who want the performance, economy or novelty of a variable-pitch prop for their own plane.

But who has told all these aspiring aeronauts about the cost, complexity, weight, plane modification and service entailed in the ownership of a small plane with variable-pitch propeller? No one. Whatever good unbridled enthusiasm does for new developments in a new industry, it should be tempered with some inescapable facts to prevent disillusionment and eventual harm to the business.

The variable-pitch designs which have been announced as ready for sale in the near future are the Annesley, Continental, Aeromatic and Beechcraft. They vary considerably in operation and control but they are representative of a number of other propellers under development.

The Annesley propeller (Figure 1) is a two-bladed, manually-controlled unit for 75-h.p. engines. Laminated wood blades are retained in a single-piece hub on ball bearings. Pins and link rods from the blade ferrules are connected so that they contact an actuator plate attached to the engine nose case at the rear of the hub. This plate is moved fore or aft by partial rotation of pins in helical slots of the actuator assembly, an action accomplished by a push-pull cable from the cockpit to a pin of the actuator.

Counterweights are attached to the blade ferrules to provide a force acting toward high pitch so that manual operation is possible. Actually, though pitch change is selective, the propeller acts as a two-position unit, allowing low pitch for take-off and high for cruise. Because the 75-h.p. unit was designed for taper and spline shaft engines, another design has been evolved which provides constant speed throughout the operating range. This model will fit flange shaft engines. Hydraulic cylinder control of blade settings is effected through oil metering by an engine-driven governor. The design still is experimental.

The price of the controllable unit is about $125 and the hydraulic constant speed unit is estimated at about $375 for a 150-h.p. installation. Very likely there will be price revisions by the time true production and material costs are known.

The Annesley propeller requires modification of the engine nose case for attachment of the actuator plate assembly. Suitable supports must be arranged through the engine compartment for the flexible cable and attachment must be made at the instrument panel. Possibly a placard will be installed adjacent to the control indicating the engine speeds at which the control should not be shifted.

The Aeromatic propeller (Figure 2) is a two-bladed fully-automatic propeller which has been in production for several years and is built in models ranging from 65 to 600 h.p. Laminated wood blades have plastic sheet covering and are retained in the one-piece hub on ball bearings. Blade rotation for pitch change is accomplished by the action of natural forces which act upon an operating propeller. The largest of these are thrust and centrifugal force.

To provide response to these forces in the propeller, the blades are inclined slightly backward in the plane of rotation so that thrust will cause them to rotate to low pitch. Counterweights are attached to the blade shanks and act to rotate the blades to high pitch. Thus at take-off, full power and high thrust cause the blades to assume low pitch. As thrust subsides with forward speed, the counterweights act to rotate the blades to higher pitch. For each successive stage of for-

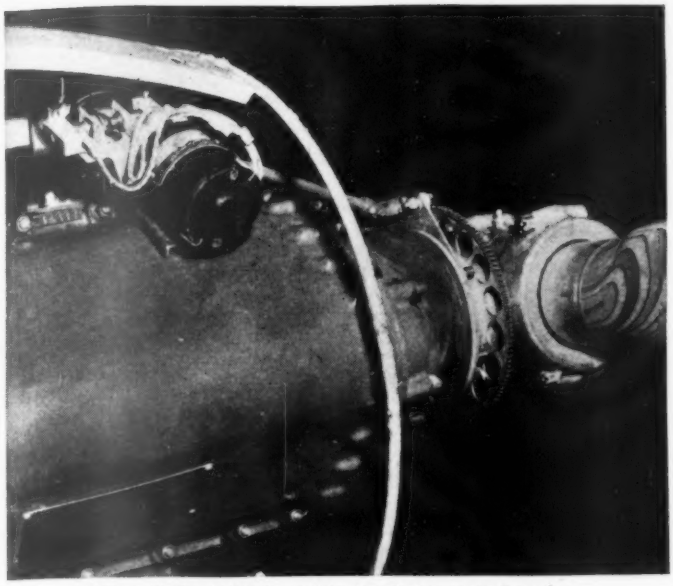


Figure 3. Beech R-203 model with electric control mechanism is intended for higher horsepower engines. This installation is on a Grumman amphibian's Ranger engine.

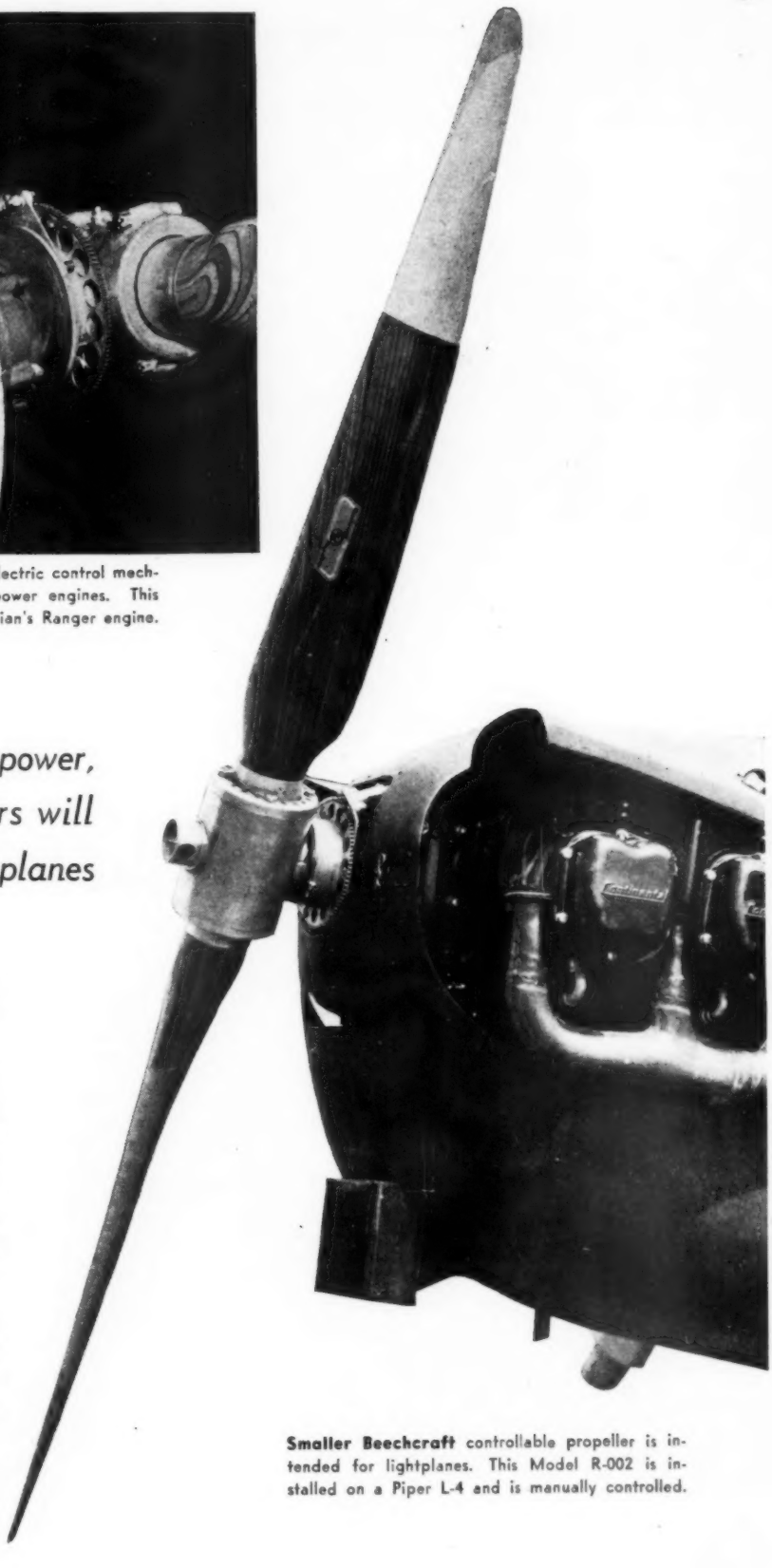
At $2 and up per horsepower, variable-pitch propellers will add performance to lightplanes

ward speed, from take-off to full throttle operation at altitude, the blades are automatically directed to assume the correct blade angles due to the balance of the major physical forces.

A co-ordinating gear is placed between the blades in the Aeromatic hub so that blade movement is uniform. The hub is fully enclosed and sealed to retain the oil used as the lubricating medium. No fixtures extend out of the hub due to the absence of controls with the fully automatic type of propeller. The counterweights, pitch stops and balance weights are externally adjusted.

Estimated prices announced some time ago for the Aeromatic indicated that a 65- to 150-h.p. propeller would cost $300, while larger models would be available at proportionally lower prices per horsepower. The 600-h.p. model was listed at $650, indicating the decrease in cost with increase in power range common to aircraft propellers.

Installation of the Aeromatic is made by attaching the hub to the engine shaft with standard attaching parts since there are no controls or linkages. However, each different type of airplane engine and propeller combination must have particular propeller adjustments due to operation by physical forces which are de-



Smaller Beechcraft controllable propeller is intended for lightplanes. This Model R-002 is installed on a Piper L-4 and is manually controlled.

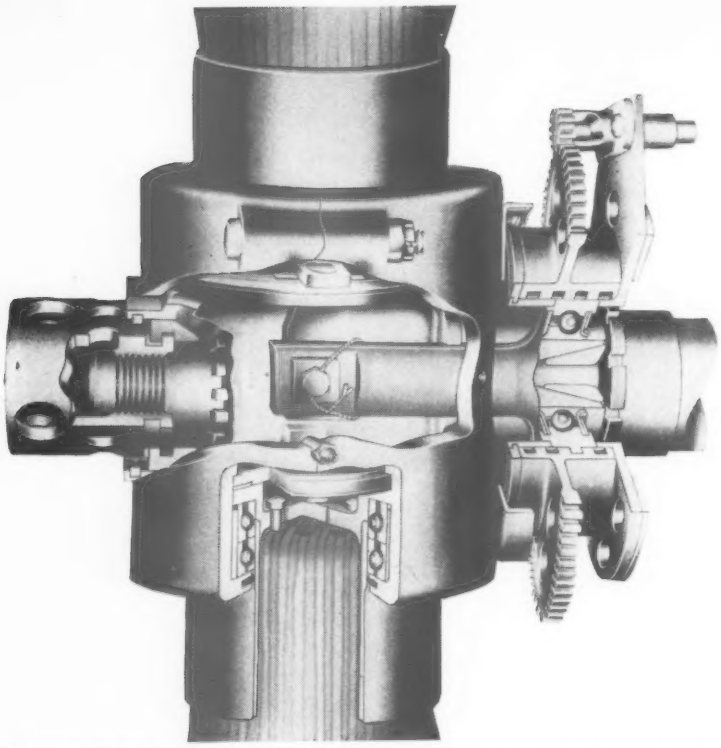


Figure 4. Cutaway of Beechcraft hub shows how gear mechanism varies blade pitch.

pendent upon power and speed. Counterweights and blade angles must be correctly adjusted because automatic operation removes the ability of the pilot to control the propeller setting.

The Beechcraft propeller (Figure 3) is offered with either manual or electric control. The manual control for 75-h.p. installations is effected through a crank on the instrument panel connected with the pitch changing mechanism on the engine nose case. This mechanism consists of a ring and pinion gear which, when rotated in either direction, causes a threaded ball-bearing assembly to move linkarms fore or aft. The forward ends of the arms are attached to the blade butts so that their fore and aft movement will cause the blades to rotate. Adjustment of blade angles may be accomplished in flight throughout the operating range between blade limits.

The hub is constructed in halves bolted together and has apertures at the rear for the link arms. The gear mechanism at the rear of the hub is fixed to the engine nose case so that the manual control rod can be attached or replaced with an electric motor drive. The electric control is intended for the larger series of propellers in the 150- to 225-h.p. class. Figure 4 shows a perspective-sectioned view of the hub.

The electric system replaces the manual drive and consists of an electric motor, pitch limit switches and cockpit control switches. In addition to the selector control switches a constant speed electric governor may also be added to operate the pitch-change motor automatically.

The price of the manual unit has been quoted as $294. For the larger 150- to 225-h.p. propeller a price of $588 has been given, with electrical control additional.

To install the Beechcraft propeller with either manual or electrical control, the pitch-change mechanism must be attached to a slightly modified engine nose case and brackets must be fitted to support the control rods and pitch-change mechanism. The manual crank or cockpit switches are attached to the instrument panel and wiring from the engine-driven governor to the motor and switches is fitted with a wiring harness.

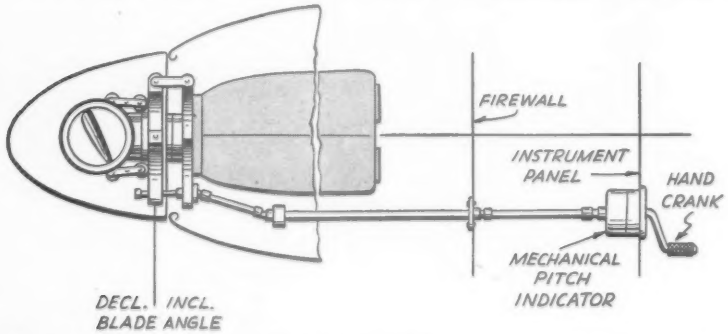


Figure 5. Plan of installation for British De Havilland manually-controlled propeller.

The Continental Aviation and Engineering Corp. *Skypower* propeller is hydraulically-operated and two-position.

Designed initially for Continental engines, the *Skypower* is controlled by cockpit linkage which is connected to a valve on the engine nose case. For take-off, the valve is positioned to direct oil at engine pressure into one of two annular, synthetic tubes, or doughnuts. The hollow tube expands under oil pressure and forces a translation member at the rear of the propeller hub rearward. This member has links which are attached to the circumference of the blade ferrule butts. The rearward movement of the member places the propeller in low pitch.

Located adjacent to the low-pitch expanding tube in the hydraulic housing on the engine nose is the high-pitch tube. After take-off and climb, the cockpit control is placed in the high-pitch position. This locates the oil line valve so that it directs oil pressure into the high-pitch tube, expanding it and rotating the blades to high pitch. The expelled oil is led back into the engine.

This propeller is a simple and apparently rugged unit. The virtues and the vices of hydraulic actuating system apply to the Continental propeller, but since the oil is contained in a closed system, leakage should not be a major problem. The tubes do not rotate and there is no packing joint. Sluggish operation due to low temperatures should be offset by enclosing the hydraulic system.

Adaptability to engines constructed to receive the propeller fittings would be easy but for other engines some difficulty would arise. Standardization for propeller application is as important as for any other unit. This has been demonstrated in the large engine-propeller field where manufacturers of both units found it imperative to adopt universal standards.

Flight operation of this particular propeller is the same as for any two-position design regardless of method of actuation. Two settings favor the extremes of the flight regime only and, unless a governor can be added, the middle spread of operation is not conducted under the best efficiency. For lower horsepowers the two settings are sufficient but a full range of blade travel is required for optimum performance from about 100 m.p.h. up.

In all fairness, claims made by exponents of the lightplane variable pitch propeller can be substantiated. Principal among these are: the horsepower range accommodates variable pitch, performance improvement, economy of operation and safety. An example of a well designed light propeller which has been operating satisfactorily for over seven years is shown in Figure 5 which is a view of the British De Havilland manually-controlled propeller for engines up to 200 h.p.

Application of variable-pitch propellers to small aircraft having less than 65 h.p.

(*Continued on page* 113)

Captain Slate's Wonderful Airship

By FRANK B. HOWE

Capt. Thomas B. Slate

TURN back the pages of aviation history and three inventions hailed today as "latest developments" become just old ideas that have been brightened up and polished a bit.

World War I saw the first controllable-pitch propeller. Jet-like engines and aerial passenger elevators came along in 1926. Capt. Thomas B. Slate, a mechanical engineer, claims to have invented them all and each was incorporated in the Slate all-metal dirigible when it was built at Glendale, Calif. Had it not been for human error on the day of the dirigible's proposed test flight—and the 1929 stock market crash—these inventions would have become "old hat" by today.

Construction of the all-metal airship began in the summer of 1926 and for two and a half years sheet metal workers and mechanics labored over the giant. It was finished just as 1929 began. The test flight was scheduled for January 5, 1929.

The craft was the first all-metal dirigible ever to be constructed and float through the air without damage from expansion or contraction of the outer covering. Others previously built in France had collapsed when tested. On several occasions prior to installation of the power plant, the Slate ship was taken from its hangar and floated about the field with no damage. (All-metal dirigibles were built later by a firm in Detroit and flown for many years.)

The Slate dirigible was constructed entirely of duralumin. It was 212 feet long and 58 feet at the widest diameter. One hundred and fifty-eight sheets of dural 1/12,000 of an inch thick, corrugated from nose to tail to give longitudinal stability, were laid over metal ribs 1/18,000 of an inch thick. The ribs were spaced 14 inches apart around the inner circumference to serve as stiffeners.

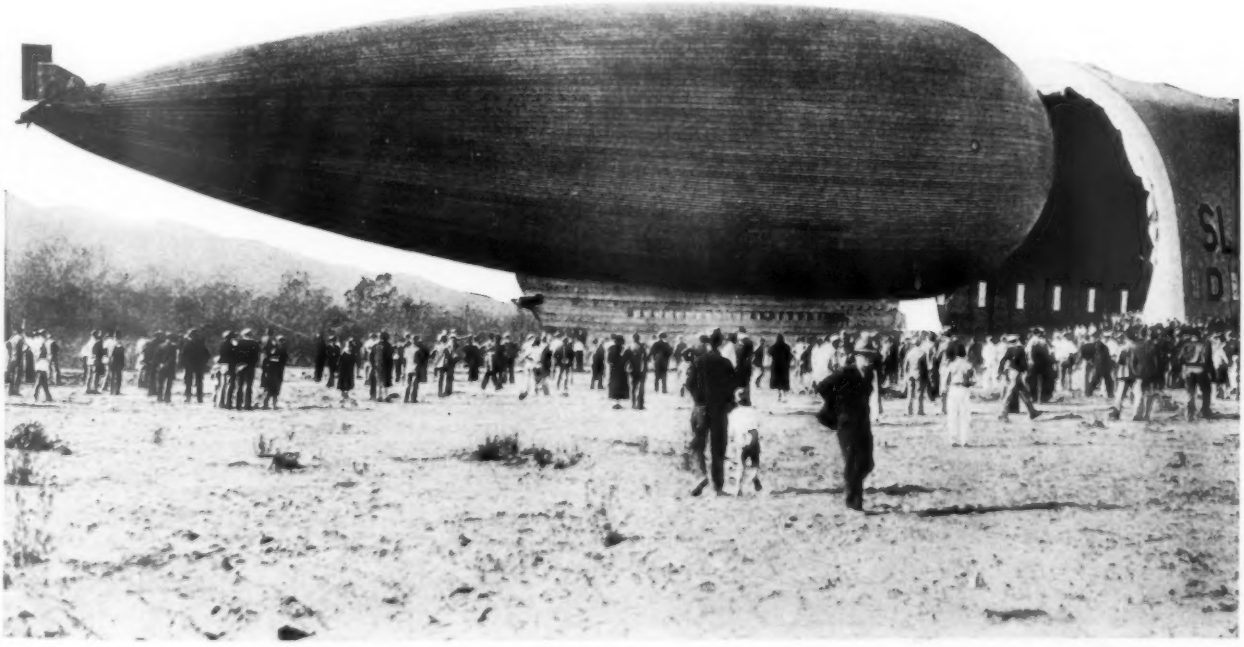
The corrugated sheeting was formed on the spot, using a stretched form method similar to that which, with the coming of all-metal airplanes, has been much publicized.

No internal bracing was needed. Because of the eggshell-type construction, the craft was so rigid that with a full passenger load aboard and no hydrogen to support it, it could be suspended by nose and tail without buckling. That never had been done before with any type of airship.

The dirigible tapered sharply from the point of maximum diameter which was far forward of center. Because of this tapering construction very small tail surfaces were possible. Orthodox dirigibles which do not taper greatly require large control surfaces to reach out into the slipstream where they can take hold.

Hydrogen capacity of the envelope was 300,000 cubic feet. The gas was made on the field in a special plant. Gross lift of the ship was estimated at 10½ tons. It had a maximum anticipated speed of 100 m.p.h. and a cruising speed of 80 and was

Ready for test flight it never made, Slate's dirigible possessed some features that were a generation ahead of their time.



to accommodate 40 passengers and a crew of five.

Estimated cost of each such dirigible was to be less than $100,000. Maximum life was to be 10 years or more. An annual flying potential of as much as 750,000 miles was expected.

Revolutionary as was the all-metal dirigible itself, the expected performance was overshadowed by a new method of propulsion which did away with propellers. Captain Slate describes it in this manner:

"The basic and key development of the dirigible is the method of driving it through the air, known as 'air displacement.' This is accomplished by means of a flat-bladed centrifugal blower located in the center of the nose of the hull.

"This blower is of the radial type, which sucks in the air at the center, with the blades throwing it out to the periphery, similar to a vacuum cleaner blower except that it has no housing.

"The principle of operation is that the blower, revolving at high speed, throws the air out of its blades by centrifugal force. This air is replaced by air drawn in from the front of the ship, building up an area of negative pressure, or partial vacuum, ahead. The curve on the hull's nose is designed so that an area of negative pressure is also created just behind the blower on the nose's surface.

"This pressure reacts on the air stream leaving the blades and causes it to bend and flow back across the nose in a flat high-speed stream which is delivered behind the point of the ship's largest diameter in sufficient quantities to build up a positive pressure on the rear taper and thrust the ship ahead."

In other words, a partial vacuum extending back to the widest diameter sucked the ship forward and the slipstream, rushing into the space back of this point, gave it additional forward thrust.

"The advantage of this propulsion is that it practically eliminates the usual retarding pressures on the hull. It stabilizes and protects the ship by means of the high-speed envelope of air which surrounds the hull at all times, and makes possible a higher air speed with less power," Captain Slate observed and added:

"The high-speed air going around the ship safeguards it from cross currents and, as the high speed blower is a centrifugal dryer to all the air that goes through it, there is a tendency to keep the surface of the ship dry in fog or rain.

"Since the blower has no pitch to its blades, it does not pull directly on the frame of the ship through its shaft and bearings. Even at high speed, therefore, the ship does not have to carry the driving stress of its own power plant."

At first it was planned to use a 500-h.p. steam turbine to drive the blower but when suitable tubing could not be obtained a radial gasoline engine was substituted.

All of this was not mere theory. A small model of the craft was built before construction began and was thoroughly tested in the Guggenheim wind tunnel at New York University, where it performed successfully. In these tests, smoke streams permitted the air's path around the ship to be traced.

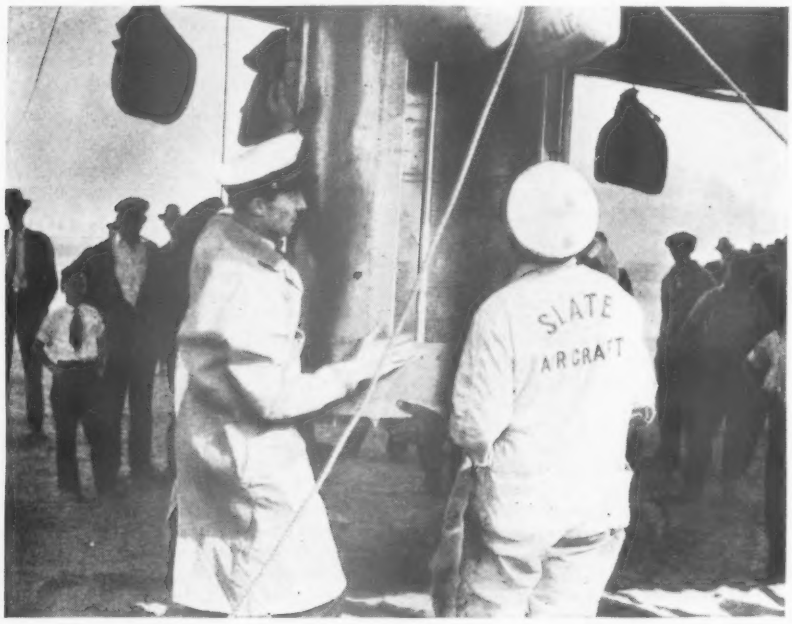
How does this compare with jet propulsion?

In jet propulsion, air is taken in toward the nose of the aircraft, compressed, and passed into a combustion chamber where fuel is burning at high temperature. This causes the air to expand, giving increased velocity. Then, passing through a very hot turbine wheel, the gases thrust the plane forward.

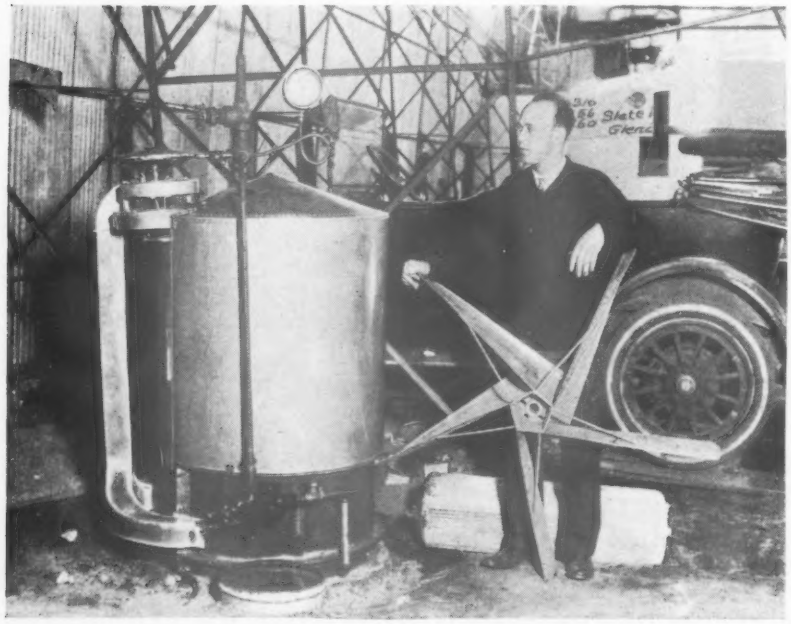
In Captain Slate's method of propulsion, the air went around the ship instead of through it, with the intention of driving the craft forward by both pull and push, instead of only by push.

As if the all-metal construction and the radical power plant were not enough innovations for one aircraft, Captain Slate

(*Continued on page* 102)



Aerial elevator was designed for passenger transferral while ship remained aloft. An enclosed unit, elevator was guided by a trolley attached to ship's anchor cable.



Steam plant (left) powered centrifugal blower blades. Installed in nose, blades created suction to point of ship's greatest fuselage diameter, pressure from there back.

King-Size Airliners

Typifying the trend toward giant planes, here are the world's largest. All of them are American-built; each has flown or is soon to fly...

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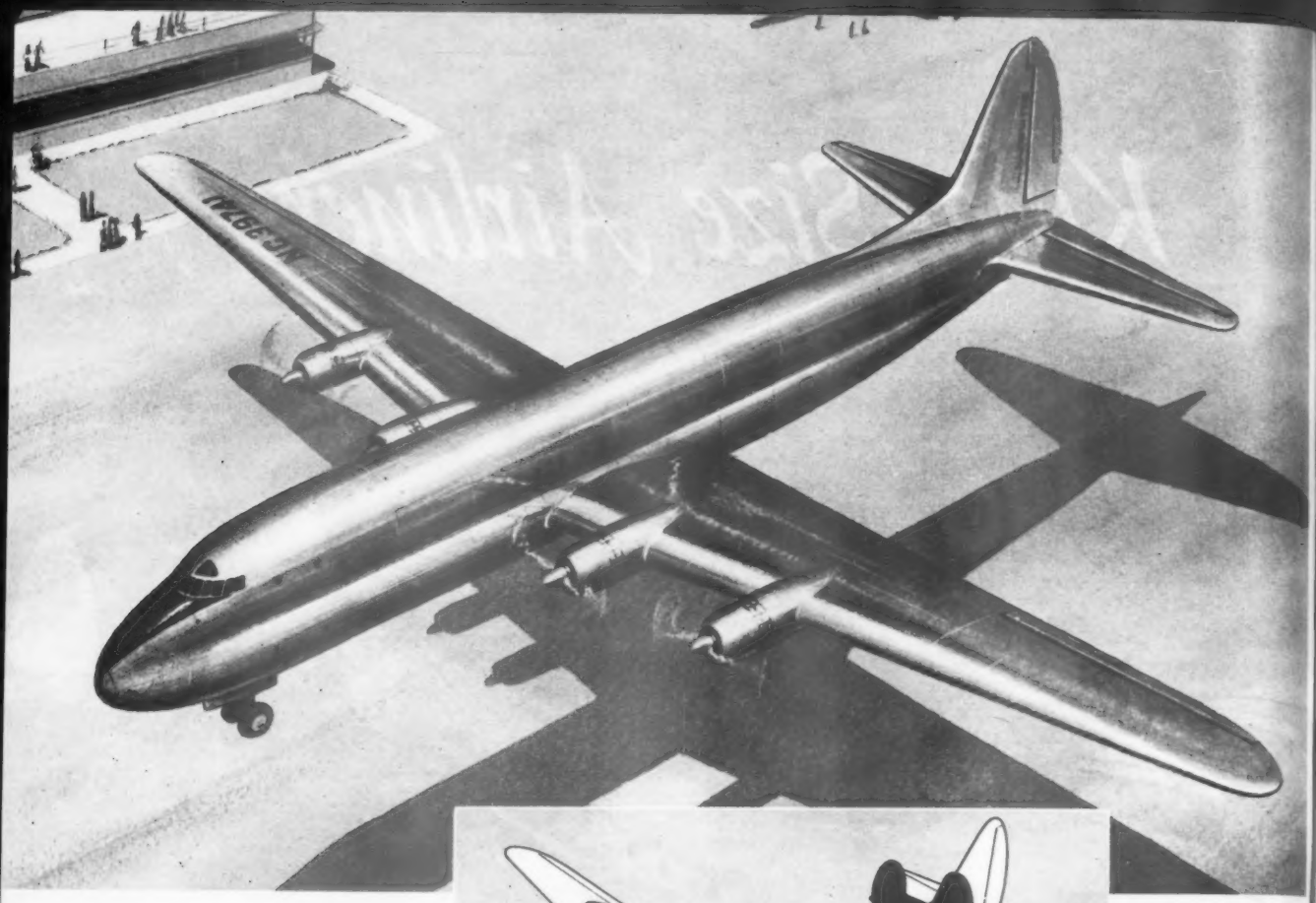


Lockheed Constellation, on preceding page, is dwarfed by its sister plane, the Constitution (above). This is an artist's conception of the new giant; its size as compared with the Constellation is shown at right. The Constitution is expected to cruise at 300 m.p.h. and carry 128 passengers; the Constellation now carries 51.

LOCKHEED CONSTITUTION

By GAITHER LITTRELL
West Coast Editor of FLYING

OUR "king-sized" airliners are here, but they aren't those mammoth leviathans with several hundred passengers swarming over three or four decks and lounging in cocktail bars and beauty shops. The reason: cost.

True, there is a 200-passenger prototype under construction and the Hughes flying boat could carry 700 passengers theoretically, but planes for years to come undoubtedly will not exceed the 200-passenger limit and the practical, every-day airliner will carry an average of less than 100 passengers. Most planes of the future, it seems, will fall into one of three size categories—60- to 100-passenger types for long ranges, 30- to 50-passenger models for medium trips and smaller craft for short hauls.

Enormous aircraft of almost any desired speed are not beyond present engineering technology to build. But there is no more point to building them than to construct triple-sized railroads and steamships. Always the questions of economical size and optimum use must be considered.

During the war all aircraft manufacturers were encouraged by the Government to develop larger and faster planes. That is the main reason for the profusion of promising prototypes today.

Prototype construction of every new plane costs dearly, whether it be a two-place private craft or

DOUGLAS SKYMASTER

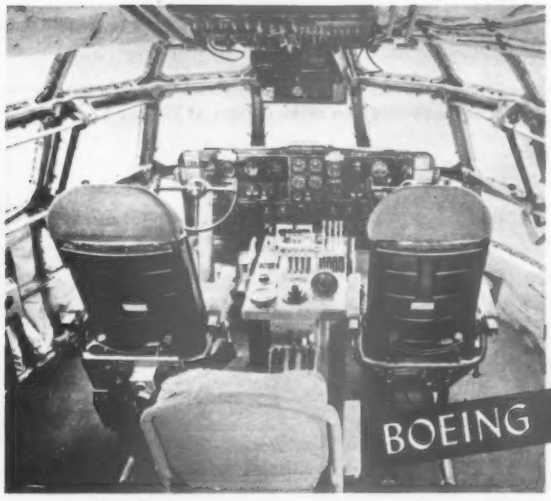
Widely used during the war but already obsolescent as it enters commercial use, the Skymaster ordinarily carries 44 persons at 220-m.p.h. cruising speed.

Pressurized and designed for a 4,000-mile range with 96 passengers, the Globemaster cruises at 250 m.p.h., has 173-foot span, weighs 162,000 pounds.

DOUGLAS GLOBEMASTER

MARTIN MARS

Last flying boat still in the running as a possible transport, the Mars still is in the Navy. It could carry 106 passengers 4,000 miles at 200 m.p.h.

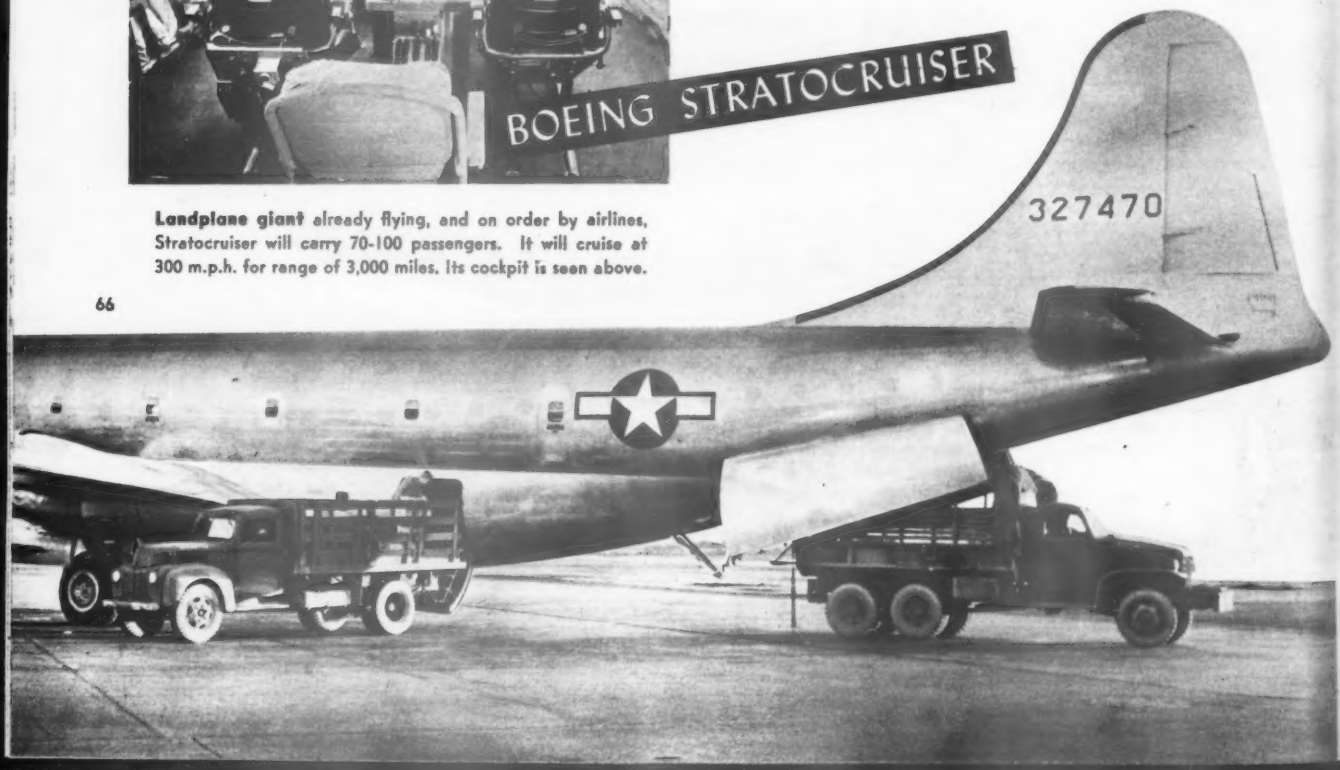


BOEING STRATOCRUISER

Landplane giant already flying, and on order by airlines, Stratocruiser will carry 70-100 passengers. It will cruise at 300 m.p.h. for range of 3,000 miles. Its cockpit is seen above.

a 100-ton transport. There are the costs of initial engineering design, wind tunnel models, plant building or revised plant layout, design and construction of jigs, dies and other heavy machinery, laboratory test work, experiments with different power plants, actual production labor costs, and finally the many changes demanded after initial test flights.

Development of the Lockheed *Constellation* to date has cost almost $10,000,000. This high cost is partly because it was constructed as a commercial carrier; redesigned (*Continued on page* 82)



REPUBLIC RAINBOW

Fastest new transport to date, the Rainbow is supposed to cruise over 400 m.p.h. at 40,000 feet. It is expected to carry 40 passengers.

Largest of all, yet-unnamed Model 37 will be a guinea pig for some time. Its radical new 5,000-h.p. gas turbine pushers will get rigid tests. It should cruise at 340 m.p.h. with up to 204 passengers. Estimated gross: 160 tons.

CONSOLIDATED MODEL 37

Forced down in a muddy field, W. H. Weber's Cub was pushed and taxied to this Oregon mountain clearing. Although only 100 yards long and surrounded by trees, the 35° slope offered a take-off strip.

Timber Take-Off

Not wasting an inch of runway, Weber and helpers backed Cub into edge of woods before attempting take-off run.

By DEWEY F. RAY, Jr.

WILLIAM H. WEBER is no cockpit novice. In his 25 years of flying he has learned a great deal about what an airplane can do and has a fair idea of its limitations. For that reason alone he still owns and flies an undamaged Piper *Cub*.

One winter day Weber took off from his home at Bend, Ore., bound for Eugene on a business trip for his building concern. It was only an 80-mile trip and he chose the *Cub* for the flight. He also owns a Waco.

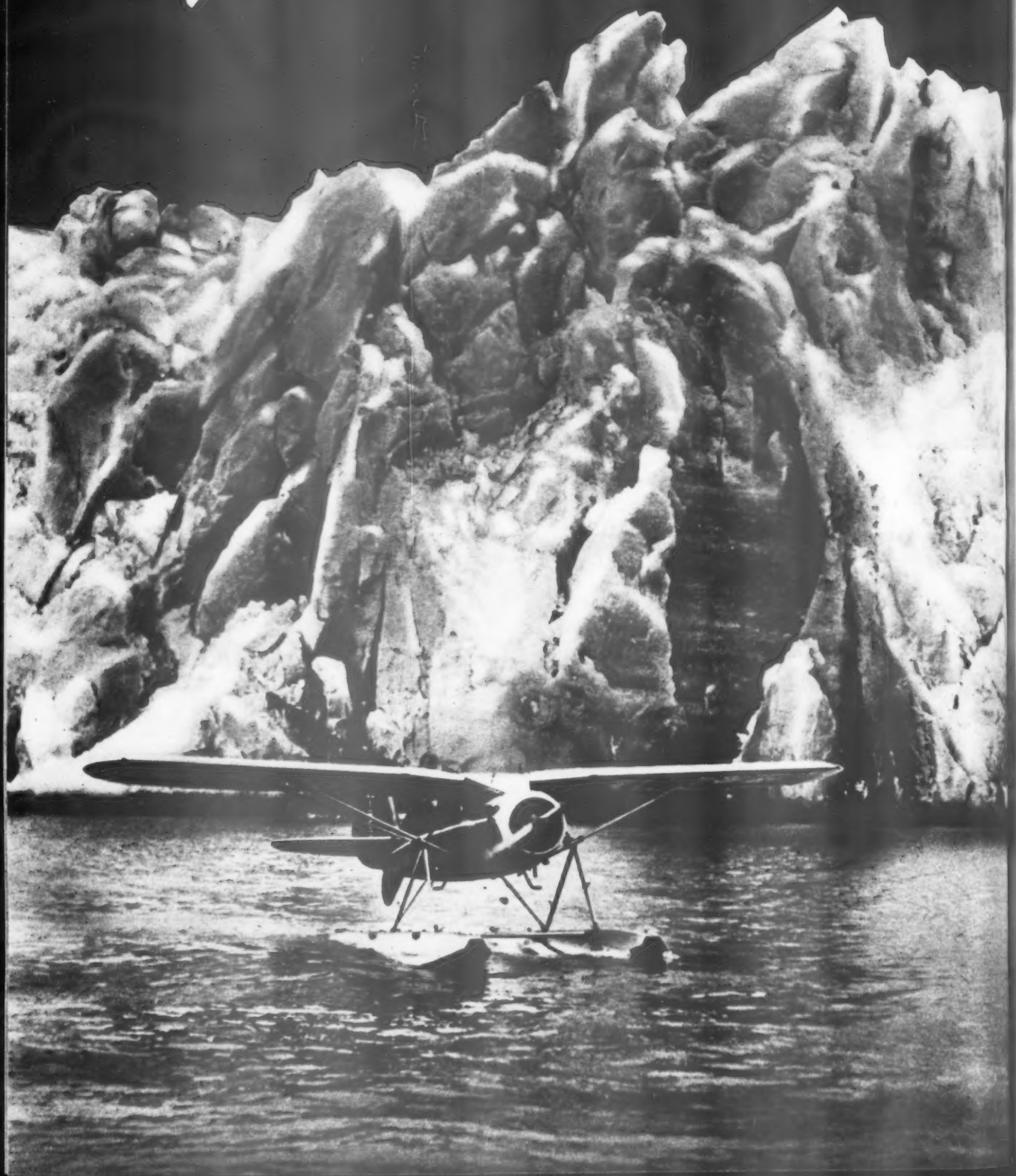
The weather began to close in once he had cleared the Cascade Mountains and was approaching his destination. Eugene was completely socked in and it was the same at all other towns up the Willamette Valley. There was a slight chance that he could make Portland, 125 miles to the north, but since the lightplane wasn't equipped with a radio he would run the risk of colliding with heavy commercial and military traffic at the Portland airports.

Returning to the Eugene area, he circled Spencer's Butte, a sharp, heavily-wooded peak south of Eugene jutting up through the fog. For an instant, an opening in the fog bank showed below his wings. (*Continued on page* 107)

Engine racing at maximum r.p.m., Cub is ready for take-off attempt. At Weber's signal men on wing struts dropped to ground while another cut a rope which bound the lightplane's tail to a small tree.

Airborne after a 75-yard run, Weber's Cub just cleared a muddy field, shot between two tall Douglas firs at end of runway with scant feet to spare. An entire fence section was torn down to lengthen field.

Poacher Patrol



Flying game agents enforce the wildlife regulations of the Alaskan interior

By C. BUDD DUGAN

Associate Editor of FLYING

FIFTY below outside and underneath nothing but glaciers, mountains and snow. The Fairchild's heater is wide open but the I-Man pilot and his companion Alaskan Game Commission agent shiver in the 6°-below-zero of the cabin.

Such is winter flying for Department of Interior men, whose job is to patrol over half a million square miles of Alaska for the Game Commission. Flying up and down trails and stream beds, they watch trapper activities, and enforce game regulations with 18 full-time workers and a small force of seven airplanes. They take census of everything from American bison to wolves and can tell almost exactly where game are feeding. They are the sole guardians of game worth $100,000,000.

Yet, in 18 years of flying 150,000 air miles a year winter and summer through some of the most desolate country in North America there has never been an accident to injure pilot, passengers or cargo in flight. Two planes have been lost. A Fairchild burned in a hangar fire and a Monocoupe was damaged when it was ripped from a dock-side mooring and tossed on the beach by high winds.

At one time, game agents (*Continued on page* 92)

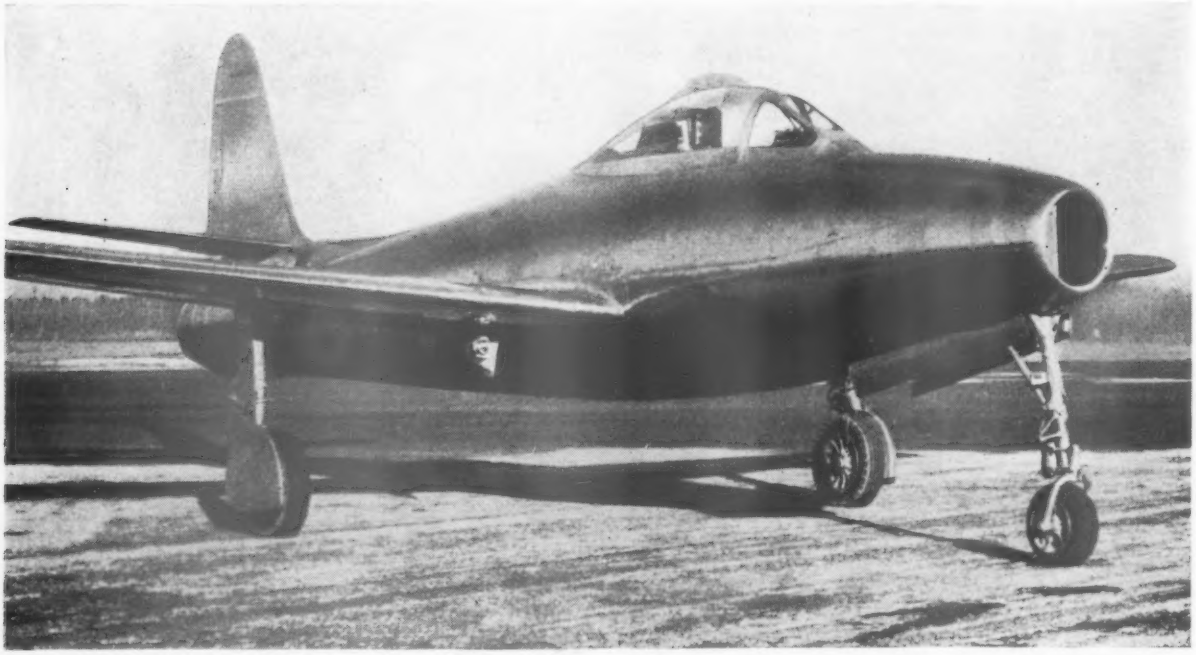
Sam White was first to fly Alaskan Game Commission patrol, proved flying is cheaper than using dog teams.

Landing site for Commission plane is marked on a frozen lake. Advice is spelled out with spruce boughs.

Illegal beaver skins and captured poacher were flown out of interior in this Bellanca seaplane. The pile at right has 536 pelts.

Have You Seen?

Experimental single-seater being tested by Luscombe, Model 10 cruises at 122 m.p.h. on its 65-h.p. engine. Top speed is over 135 m.p.h. Wing span is 25 feet, gross weight 845 pounds. First flown in December, 1945, it is still undergoing extensive test.



Republic jet fighter is XP-84, now undergoing flight tests at Muroc Dry Lake AAF base. It has a single General Electric TG-180 jet unit; top speed is reported over 600 m.p.h. It is first American jet fighter with the engine's air intake in the nose.

Skis now are approved for the Ercoupe. They are conventional except that nose ski is steerable through control wheel. Ercoupe also has been approved as a seaplane on a standard pair of floats.

Jet-assisted take-offs for jet fighters now are being made. P-80 test take-off is shown above. Two Jato units were used (inset) to speed up the jet fighter's otherwise slow and long take-off run.

Radio-controlled target, Interstate TD3R has two 450-h.p. engines, can carry 2,000-pound bomb load. Top speed is 180 m.p.h.

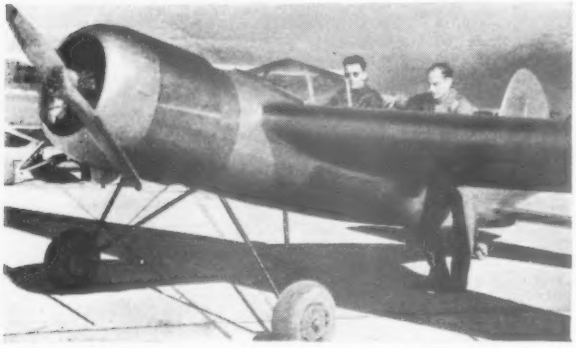
Flying laboratory, a C-54, now is in South Pacific on Army Tropical Science Mission. Plane has five tons of test equipment.

Have You Seen?

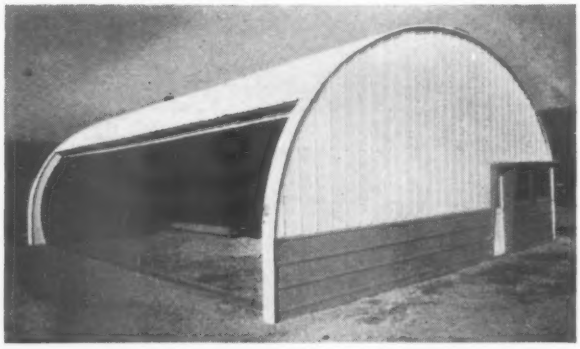
CONTINUED

This horse recently was flown from San Diego to Los Angeles by Flying Tiger Line.

Eshelman Winglet is two-place experimental lightplane with 100-h.p. engine, span of 30 feet, cruising speed of 115 m.p.h. Novel tube for spar holds 25 gallons of fuel.



Geodetic lightplane under test at Salt Lake City has 55-h.p. engine, is reported to cruise 125 m.p.h., stall at 35 at 4,500 feet.



Steel Butler hangar now in production will house plane with 40-foot span, has electric door and small office. Price is $1,600.

Two 22,000-pound bombs were carried by B-29's toward the end of the war. British designed bombs were carried externally.

First two-control plane, the Stearman-Hammond (top) is back as the four-place 220-h.p. Kaiser-Hammond (above).

I Learned About Flying From That!—No. 78

By STANLEY A. HALL

Engineering Designer and Service Pilot, Northrop Aviation Company, Inc.

Author Hall holds both power and glider ratings.

Five errors added together brought a crash to this glider instructor and his student.

IT HAPPENED during the early stages of the war when I was a civilian flight commander assigned to an AAF contract glider training school in Arizona. Our Vultee *Valiant* basic trainer pulled up the slack on the tow ropes and our two little gliders were soon airborne as we took off in the dark, crisp air of early morning. Our flight was going out as the last elements of the night flight were landing.

I was in the instructor's seat of a two-place glider with a student. The other glider, a single-place plane, was flown alone by another student to my right. We headed for our section of the sky which had been quartered off in the interests of safety, and settled down for a routine tow. In practice, the zoning system was operated so that the towplane and its two gliders would circle about its assigned zone until cleared to land at the field by a light from the control tower. In this way, each of the four towing elements was kept clear of the other by a time and distance interval.

After a few minutes it became apparent that the pilot of the towplane was not taking us into our assigned zone but into one already occupied by another element. This caused me some concern since we were without lights. My overzealous endeavor to minimize a maintenance problem had caused me to give orders that all batteries be removed after the night flight for recharging. This decision was based on the assumption that the sun would soon be up and there was enough visibility at take-off to enable me to see, though dimly, the towplane and the glider sharing my tow.

A few minutes later I was on the edge of my seat peering into three sets of red and green lights, with the red lights on my right. They were coming directly toward us—and of course they couldn't see us.

Our towpilot, making his first solo tow and in an airplane with which he was relatively unfamiliar, was so busy inside the cockpit that he didn't see the oncoming lights.

After a few more seconds of waiting for the towpilot to swing clear I took the controls from the student and motioned the student in the second glider to pull farther to the right while I pulled into the position he originally held. This placed both gliders to the right of the towplane and was intended to nudge its tail around enough to give the pilot the idea. This little trick had worked successfully on previous occasions when we wanted the towplane to assume some other direction.

But our towpilot had other ideas. He fanned the rudder vigorously several times, slapped open the hatch and waved excitedly. What I saw next left me aghast.

In his excitement the pilot had jettisoned the towline.

There we were, 14 miles from the field, with only 1,000 feet altitude above some of the roughest, most forbidding desert in Arizona—and tied together with 500 feet of $\frac{5}{8}$-inch manila rope. We yanked the releases repeatedly but they were useless, having been designed to release only when under load from the towplane.

I picked out a likely landing space where the saguaro cactus were only about 10 feet high—and not much farther apart —and motioned the student in the other glider to swing in under me and take a position off my left wing. I then made a slow turn to the right to align us with the length of the field. As we neared the ground we could see the tangled jungle of the desert. I pressed the nose of the glider down, thinking that if our trailing rope were to snag any undergrowth our inertia would tear it free. A fine theory, except that I failed to reckon with the biggest saguaro in the desert, an old fellow standing some 20 feet high and measuring at least 18 inches across.

If you have ever seen a scampering calf snapped up short at the end of a lariat, you can visualize what took place

(*Continued on page* 98)

THE LIBRARY

GUY GILPATRIC'S FLYING STORIES; published by E. P. Dutton and Co., 300 Fourth Avenue, New York, in 1946. 287 pages. Price $2.50.

Even if you have never experienced the thrill of looking down on the clouds, of wondering how cloth-covered wings can keep you sailing over the countryside, you will still thrill to these stories by Guy Gilpatric.

Famed for his "Mr. Glencannon" sea stories of *Colliers* and the *Saturday Evening Post*, the author here compiles 17 fictionalized pieces he has written about flying during the past 40 years. Gilpatric was first bitten by the aviation bug at seven when he saw pictures of the Wright brothers' first flights. Later, at 16—according to the biographical introduction to his stories—he soloed in a French Deperdussin monoplane.

The stories, arranged more or less in chronological order, take the reader from those days of wire and cheese-cloth flight, through World War I, the 20's and 30's, and then end with two stories of the World War II era.

Gilpatric's stories seem accurate, but even if they were riddled with error, the book still would be delightful for either groundling or flyer.

—C. BUDD DUGAN

THE LAW OF AVIATION, by Rowland W. Fixel; published by the Mitchie Company, Charlottesville, Virginia, in 1945. 396 pages. Price $7.50.

This second edition brings the first, of 1927, up to date by enumerating and partially identifying 382 aviation law problems within a compass of 290 pages of text. Four appendices, dealing with current aviation agreements, a table of cases, and an index complete the volume.

The book will be of interest to the layman who wishes to know something of the kind of legal problem which aviation has developed and to the beginning lawyer who wishes to know something of the field. Subjects dealt with by the author include Historical Background, Sovereignty in Air Space, Relation to International Law, Aerial Warfare, Rules of the Air, Airports, Seadromes, Right to Fly over Another's Land, Criminal Law, Insurance, Workmen's Compensation, Taxation, and Civil Aeronautics Act of 1938.

—FRED D. FAGG, JR.
Director, Institute of Aeronautics,
Northwestern University

FLYING

"He takes some awful chances. One of these days his brakes won't work."

SHORT VIEWS

PROCEEDINGS NATIONAL AVIATION CLINIC, 1945; published by Times-Journal Publishing Co., Oklahoma City, Okla. Price $2.50.

This is an abridged record of proceedings of the third annual National Aviation Clinic held in Oklahoma City, November 19-21, 1945. Few modifications have been made in the prepared papers read at the sessions. Material in the book has been arranged in sections and follows closely the order in which it was presented at the clinic.

The themes of the sessions include: The Aviation Industry, Air Transportation, Private Flying, Air Defense, and Aviation Education. There are four or five papers under each theme. The book also contains resolutions adopted, roster of attendance, official delegates, and several photographs taken at the conference.

WINGS OVER AMERICA, The Future of Air Power, by John Stuart; Public Affairs Pamphlet No. 114, published by Public Affairs Committee, Inc., 30 Rockefeller Plaza, New York 20, N. Y. Price 10c.

This pamphlet warns that American air supremacy may be dissipated because of inadequate research, development and planning for civilian flying. It cites surveys which seem to indicate that expansion in air transport and personal flying during the next few years will be insufficient to maintain an aircraft industry adequate for national security.

The problems faced in each of the three fields of airplane development—aircraft for military, transport, and personal requirements—are discussed. It is vital, the author concludes, that research and experimentation be continued in peacetime.

TWO-WAY RADIO, by Samuel Freedman; published by Ziff-Davis Publishing Co., 185 N. Wabash Ave., Chicago, Ill., in 1946. 506 pages. Price $5.

A broad outline of the possible uses of two-way radios in many fields, including aviation. Parts of the section devoted to aviation communications will be useful to the private pilot contemplating the purchase of a two-way radio. It lists prime requisites for aircraft radio installations.

SCIENCE FOR YOUNG MEN, by A. Frederick Collins; published by D. Appleton-Century Co., 35 West 32nd Street, New York, in 1946. 257 pages. Price $3.

Six of the eight chapters in this handbook touch phases of aviation and should be interesting to those with ambitions toward a career in aeronautics. END.

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AOPA NEWS

The Aircraft Owners and Pilots Association (AOPA), with National Headquarters Office located in the International Bldg., 1319 F Street, Washington 4, D. C., is a nonprofit organization composed exclusively of pilots. It looks after the pilot's best interests in all phases of aviation and helps individual pilots with their individual problems. The AOPA operates with a full-time professional staff and is the largest group of civilian pilots in the world. This column is edited by the Aircraft Owners and Pilots Association and opinions contained in it are not necessarily those of FLYING. A special bulletin is sent each month to all registered AOPA pilots and also confidential newsletters from AOPA's Washington staff are sent members from time to time

LANDING FEES AGAIN

Members of the New Horizons Flying Club are demanding immediate abolition of the $1 landing fee at Westchester County Airport near White Plains, N. Y., and have requested AOPA, long an opponent of the landing fee nuisance, to support the campaign. A thorough investigation is under way.

Strong letters of protest have been sent by the club to the Westchester County Executive, to North American Aviation Corporation (which manages the airport) and to Gulf Oil Corporation, of which North American is a subsidiary. Other Westchester flyers have joined the club in its fight to abolish the landing fee, which is even assessed against aircraft sales agents who visit the airport to discuss business with their local distributors.

UNIFORM AIR MARKING

The National Association of State Aviation Officials has adopted a resolution approving the uniform air marking system of the CAA and urging all states to begin air marking as soon as practicable. CAA reports that many states have endorsed the air marking standards as laid down, but a group in California is advocating a code system of air marking which would be confusing to pilots. AOPA is backing the CAA system and believes that any major departure from degrees and minutes of latitude and longitude would be confusing to the transient flyer.

The AOPA, CAA and representatives of a radio manufacturer recently discussed the application of a radio aid for the air marking program. It would include automatic aural reception of location markers (in voice).

FCC FORM SIMPLIFICATION

FCC representatives have agreed to simplify the application forms for aircraft radio station licenses and to give immediate consideration to an AOPA proposal that the six months frequency check requirement be relaxed. At the same time, FCC favored standards approved by the Radio Manufacturers' Association for personal aircraft radios, and agreed to send a representative to future AOPA-CAA conferences on combining the CAA and FCC inspections of radio transmitters. The FCC also announced that no licenses will be issued to any surplus Army and Navy aircraft transmitters before considerable modification is completed on such installations.

Two sets of specifications covering aircraft radio are to be prepared soon by the Radio Manufacturers Association. One will comprise mechanical standards necessary for radio use for contact flight and the other will cover electrical standards and mechanical standards for radio used in premeditated instrument flight. The two categories were suggested and are recommended by AOPA to permit manufacturers of approved types of inexpensive receivers and transmitters to guard against penalizing, so far as cost is concerned, the pilot interested only in contact communication. The RMA has agreed to issue a "seal of approval" for each category.

OAKLAND AIRPORT CHARGES

Ralph H. Thatcher, president of AOPA's Metropolitan Oakland Unit, has gone to bat against proposed high hangar and handling rates for the Oakland Municipal Airport which are more than double the pre-war rates at Oakland.

In a letter to the manager and chief engineer of the Port of Oakland, Thatcher pointed out that the proposed charges would be the highest in the United States and much higher than any other hangar rates on the West Coast. Thatcher informed the manager that AOPA's airport committee is ready to assist in any way in arriving at fair and equitable rates for the Oakland Airport.

An AOPA survey has disclosed that at West Coast fields comparable to the Oakland airport the average monthly hangar rental is $16 and the average monthly tie-down rate is $7. Oakland proposes a hangar rental of $32 a month for the private plane owner and $40 for clubs. For tie-down the individual would be charged about $11 and the club about $15 a month.

NOISE ABATEMENT

Practically no research to reduce prop and engine noise is under way. Stinson has installed two mufflers on the "150" but their major purpose is to reduce cabin noise for better radio reception.

In this connection, however, CAA recently conducted an interesting and revealing experiment with one of its noisy BT-13s. CAA engineers cut a foot off each end of the BT-13 prop. Result: noise was reduced, there was a better rate of climb and some increase in top speed. Another result: take-off run was increased by about 60 feet.

In an attempt to clarify the airplane noise picture, AOPA has asked the NACA for specific information on mufflers and propeller tip noises. Questions are:

What percentage of noise made by any typical lightplane is due to engine exhaust, propeller, engine or other causes? What size and weight muffler is recommended to reduce exhaust noise? How much will such a muffler reduce the noise and would it bring about a reduction in engine power? What reduction of propeller speed is recommended to cut prop noise? What would be the best prop diameter at the new r.p.m., how many blades would be required and how much would it weigh? What is estimated extra weight of the reduction gear, if any?

FREE LINK TIME

The Philadelphia Aviation Corporation, of which Guy Miller is president, is offering AOPA members in that area 30 minutes Link time without charge. Normally, the charge is $8 per hour. The offer holds for only a few months, since the trainer will be busy this summer.

CRASH INJURIES STUDY

The crash injuries project conducted during the war by the National Safety Council has been transferred to CAA. It could have a profound influence on lightplane cockpit design.

Some amazing facts concerning injuries with relation to instrument panel arrangement were uncovered during the Council's wartime studies. AOPA is urging manufacturers of lightplanes (who have had an opportunity to study the findings) to incorporate in their new models changes designed to provide greater safety for pilots and passengers involved in major accidents. The matter of cockpit safety will receive continued AOPA attention and CAA has been asked to give full support to this project.

AOPA MAP SERVICE

Preliminary discussions with the aeronautical chart branch of Coast & Geodetic Survey have covered the possibility of obtaining a special map service for members. Maps at reduced rates and free charts for members participating in map check flights were discussed. One member has recommended the adoption of maps similar to those used in England which show in color important topographical features. They are varnished so that courses can be plotted and erased without damage to the maps. AOPA invites member pilots' opinions regarding present aeronautical charts and the manner in which they may be improved.

INSPECTION SLOW-DOWN

The need for a marked increase in the number of CAA inspectors is steadily becoming more apparent. Approximately 3,000 aircraft are grounded in the Santa Monica region of the CAA alone, awaiting inspection. CAA plans to increase its inspection staff but is moving much too slowly. Plans to "deputize" repair bases to complete inspections and licensing are going forward at a snail's pace. END

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TUNE IN "INFORMATION PLEASE"—MONDAY EVENINGS, 9:30 E.S.T.—NBC

HANGAR FLYING

LOCKHEED

PILOT-BOOSTER

Few people know that at one curious stage in the development of the *Constellation*, the plane's hydraulic booster system worked *too* well.

The plane was designed so that the boosters, instead of the pilot, would do most of the work moving the control surfaces. For every pound of push the pilot puts on the rudder pedals, for instance, the booster now exerts 23 pounds of pressure to move the rudder. Saves the pilot a lot of wrestling. And assures really full control of big, modern four-engine airliners.

Well anyway, early in the game Lockheed perfected the booster system to such a point that you could practically fly the *Constellation* with your little finger. This reaction, of course, was too sensitive for general use... but the point is that the all-important "feel" of the ship has been tailor-made to the exacting wishes of experienced pilots, who swear by it.

Now, to passengers and pilots, the *Constellation* acts like the thoroughbred she is. Her foolproof booster system (the only one with a C. A. A. approved type certificate) makes the 45-ton, four-engine plane handle as lightly as a twin motor job.

Like everything else on this ship, the boosters were developed by imaginative, painstaking engineering... the kind that keeps Lockheed leading the field.

L to L for L

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Letters

Reader comments should be addressed to Letters Editor, FLYING, 185 N. Wabash Avenue, Chicago 1, Illinois. All letters should be signed. Names withheld upon request.

'THE BITE'

I have read with a great deal of interest "The Bite" in your February issue which just hit my desk this morning. I immediately passed it on to Charlie Moffitt, our service manager, as "must reading." I certainly realize the viciousness of the problem without having any very intelligent suggestions, if any at all, for its correction.

I do know that in some cases operators are criticized unfairly for excessive charges which they are unable completely to anticipate. In some cases what seems to be a crooked bite is really failure to make clear just what the overhaul estimate covers; and perhaps a failure to make a good estimate: Lastly, and this is a vicious practice, by doing work that he finds absolutely necessary without giving the customer an opportunity to examine the unexpected condition and to authorize the work.

There is no doubt that manufacturers can co-operate, when they get going on post-war sales, by insisting that their distributors give good service at the best prices the labor market will permit. Certainly, on smaller airplanes, where the operator is doing repetitive service, he should be able to set standard charges on a great many operations. These charges should be posted and, of course, adhered to.

The same problems existed for years in the automobile business, but competition has taken care of the matter and the gyp garage is largely out of business.

I certainly agree with you that practices such as covered in "The Bite" are bound to retard aircraft sales, and everyone should join in trying to suppress them —the manufacturers, the trade papers, the AOPA, and other associations. The aircraft manufacturer can do his part by considering it just as important to investigate the distributor's service as to urge the distributor to buy more airplanes and to do more selling.

HUGH R. PERRY
Vice-Pres. and General Manager
The Waco Aircraft Co.
Troy, O.

Fred Hamlin's article, "The Bite," does a sound job. All of us who are working toward making personal flying something that will be within the reach of more and more people know that many changes will have to come about before our ambitions are realized. It will be a continuous struggle to sell the fact that the immediate dollar may not be as important as building up a satisfied clientele. Other businesses have learned this the hard way and that's what we seem to be doing now.

Here at Republic we have been very selective in setting up our own dealer-distributor organization and we intend to follow through by providing facilities at the plant where our dealers and distributors can bring their service mechanics for an indoctrination course on maintenance of the *Seabee*. I would like to establish standards for such service which go beyond the merely mechanical into the field of sound salesmanship.

I hope that your magazine, as well as other publications, will continue to point up this problem until it no longer exists.

ALFRED MARCHEV, President
Republic Aviation Corp.
Farmingdale, N. Y.

I believe that the situation you have discussed [in "The Bite"] is directly due to a seller's market in the field. The same attitudes of indifference, faulty service and exorbitant charges are to be found in all sorts of retail establishments and service organizations.

With the opening of new airports and an adequate supply of new light aircraft, normal competition will eliminate operators who hold to this faulty attitude.

However, I believe that the steps you have outlined to remedy the situation are in order, and will assist normal competition in correcting this condition.

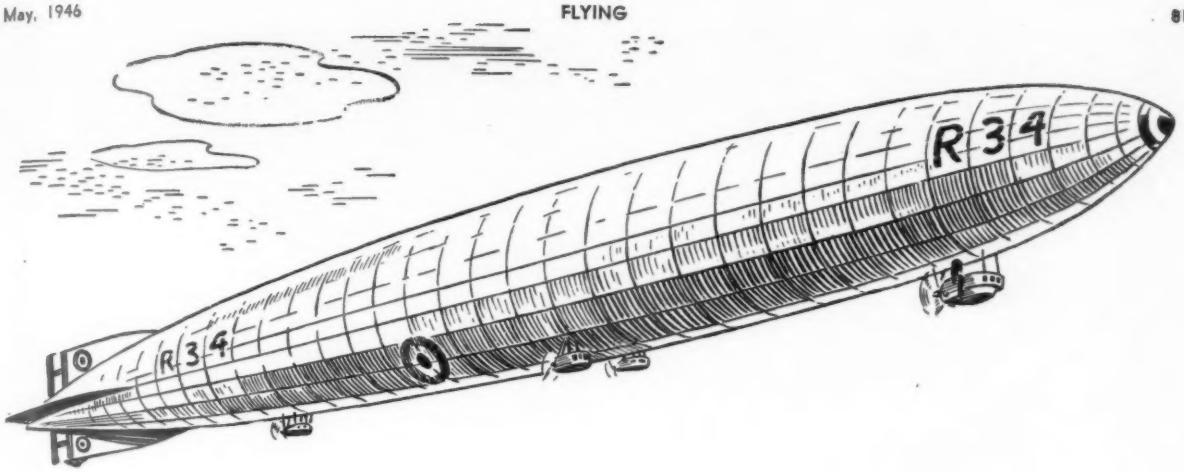
JOHN P. GATY
Vice-Pres. and General Manager
Beech Aircraft Corporation
Wichita, Kan.

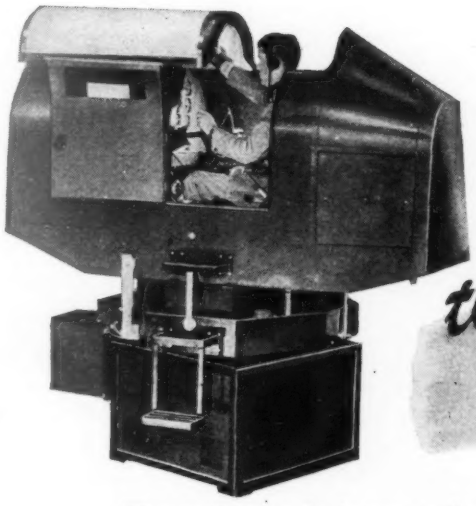
We operate a fleet of Aeronca trainers and the heart-rending testimony of victims of "The Bite" certainly made interesting reading.

Overlooked was the fact that the people making these complaints apparently failed to investigate the other side of the story. Figures quoted on flying rates varied widely but very little was said about condition or type of equipment, or about conditions under which such equipment was stored or maintained. All of these factors have a bearing on the cost of operation and an effect upon the per hour rental cost of flying.

As an operator charging $8 solo and $10 dual, I wish to present some facts. The operator's prices are controlled by his costs; and there are many factors beyond the control of the operator which are responsible for costs. For instance, most of the flight operators in the coun-

(Continued on page 116)





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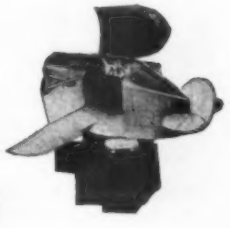


Link training is your first step into the FLYING AGE

King-Size Airliners

(Continued from page 66)

for the military, and then redesigned again for commercial use, more than $8,000,000 has gone into designing and building the outmoded Douglas DC-3 series. It cost $4,500,000 to develop the one and only B-19. If it had gone into production, necessary changes would have boosted that figure considerably. The huge Consolidated Vultee Model 37 has so far represented an outlay of about $5,000,000 and is still in construction. The Douglas DC-7 has cost practically the same amount but the figure will go up because of changes demanded after the first flight test is completed.

A more striking example is the Hughes H-4 seaplane (See FLYING, April, 1946), the largest heavier-than-air craft ever designed. Approximately $20,000,000 has gone into the 200-ton, all-wooden plane, but it is still not ready to fly. Of the total only $2,000,000 is company capital, while the remaining $18,000,000 is public funds made available through the Defense Plant Corporation.

There will be only one H-4 built, according to Charles Perelle, former general manager of the Hughes firm. The plane was designed and construction started in mid-1942 when it appeared that the United States would need out-sized cargo planes to supply military demands across wide stretches of ocean. Since then smaller and less costly planes, flying much faster than the H-4's estimated cruising speed of 175 m.p.h., have been making transoceanic schedules with one take-off about every four minutes every day. All of which causes Perelle to admit freely that no interest has been shown by airline officials in the H-4.

Consumers of the products manufactured by large aircraft builders are, naturally, the airlines of the world. None of these, according to their operations officials, have need for an airplane the size of the H-4. Only a few, likewise, have need at present for planes the size of Model 37, the DC-7 and the Lockheed *Constitution*.

Cost again is a paramount reason.

A recent survey by the Air Transport Association disclosed that the country's 19 scheduled airlines have placed $300,000,000 worth of orders for new planes during the 1946-47 period. This figure is expected to go up to $750,000,000, including ground equipment, in the following five years. The airlines have estimated that their post-war needs are for 975 planes with a total seating capacity of 36,180. The companies have on order or option 409 of this number, seating 23,275 passengers. The remaining 466 would be delivered in the five-year period.

Even in volume production, the cost of a 200-passenger plane would be $2,500,000 to $3,000,000. The 96-passenger DC-7, with all the proposed niceties and conveniences for passenger comfort, has been quoted to the airlines at roughly $2,000,000. This cost was raised from the original estimate of $1,250,000 each because the Army cancelled most of its production order.

The first post-war commercial 51-passenger *Constellation* was delivered to TWA last November at a price of roughly $833,000, including spares. The DC-6s, to be produced by Douglas, are designed for 48 to 60 passengers and now are estimated to cost about $600,000 each without spares. Two-engined craft, carrying 30 to 40 passengers, will cost approximately $400,000 with spares.

The only 200-passenger plane being constructed is the Model 37. The prototype is due to fly in mid-1946. Pan American has placed an optional order for "up to 15." But the option is contingent upon the final price and anticipated performance.

These planes are cited merely as examples of what planes twice and three times as large would cost. A 400-passenger "dream plane" reasonably could be considered to sell for $5,000,000 to $6,000,000 after $20,000,000 to $25,000,000 went into construction of the prototype.

The question arises, who would pay for it?

Commercial airlines shy away from investments in prototype planes. They are averse to sinking millions into a project only to find after test flights that the plane is not economic to operate or maintain. So are the aircraft companies, which themselves could not afford the initial outlay. If a particular big plane is to come into existence, outside financial help will be needed to father it.

Some aircraft company executives have suggested that the larger commercial carriers agree upon plans for one particular type of aircraft. Their combined financial help would see the proposed plane into the air and through acceptance tests. If the plane were found airworthy and economical all the participating airlines could place a quantity production order and bring the price down to a reasonable level. The only trouble under this plan is that a single manufacturer would get the business and the idea is given little consideration.

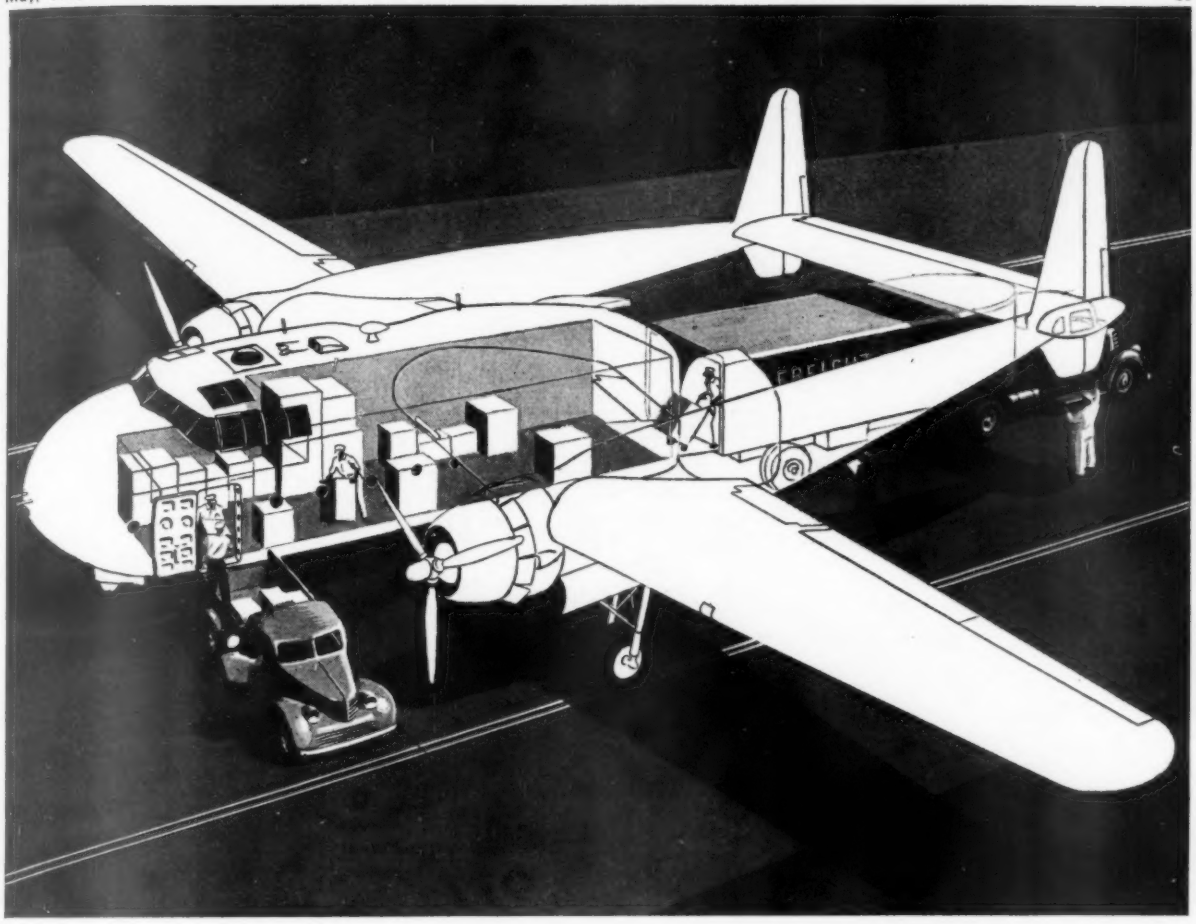
Here are examples of "king-size" aircraft now being made:

HUGHES H-4. The largest plane being built, has a wing span of 320 feet, or 20 feet longer than a normal city block. The length is 220 feet, the hull 30 feet high and 25 feet wide. Gross weight will be approximately 400,000 pounds. It will be powered with eight Pratt and Whitney *Wasp Major* engines, each developing 3,000 to 3,500 h.p. and each equipped with four-bladed propellers measuring 17 feet tip to tip. High speed at sea level will be 218 m.p.h.; cruising speed, 175 m.p.h. and landing speed, 78 m.p.h. It will carry 14,000 gallons of fuel—or 42 tons—in 14 tanks. The plane is built almost entirely of wood. It was engineered to carry 350 military hospital patients but could accommodate 700 "sit-up" passengers if so designed. It could transport approximately 35 tons of cargo if distance were not too great and all fuel tanks did not have to be filled to capacity. This "king-size" flying boat is to fly this summer at Long Beach, Calif., where it will be moved from the Culver City plant at a cost of $2,000,000. What will be done with the plane after its initial tests is a question to which Hughes officials have had no answer so far.

CONSOLIDATED VULTEE'S MODEL 37. This plane, outstripped in size only by the H-4, is the biggest thing on wings scheduled for regular airline operation. It will have six gas turbine engines, each developing 5,000 h.p., mounted as "pushers" on the trailing edge of the wings and each with co-axial propellers. Wing span is 230 feet; length 186½ feet and height 57½ feet. A total of 204 passengers and a crew of six will be carried at a cruising speed of 340 m.p.h. or a top speed of 370 m.p.h. with a range of 4,000 miles. Total payload will be 66,500 pounds, gross weight will be 320,000 pounds. Model 37 is being built in two different plants. The huge wing is being fabricated at the Consolidated plant at Downey, Calif., and the two-deck fuselage at San Diego, where wing and fuselage are to be mated. The maiden flight is expected to be made very soon. It is anticipated that several years may elapse, however, before Model 37 is delivered to airlines in quantity. There are many engineering problems to be studied in connection with pusher type engines on big craft and the first Model 37 will serve as a guinea pig.

LOCKHEED CONSTITUTION (C-89). This big craft, which is to be put into the air for the first time this summer, is to carry 128 passengers and a crew of 11. The Navy, for which the prototype is being built, has not released dimensions. Gross weight is estimated at 190,000 pounds. Power will be supplied by four

Douglas DC-6, designed to carry up to 70 passengers, recently flew. Version above has four Pratt and Whitney 2,100-h.p. engines; another is powered with four 1,630-h.p. Allisons.



The INSIDE Story of the Packet

Speed creates profits for air cargo operators—speed *on the ground* as well as speed in the air.

Fairchild engineers, planning the Packet to carry cargoes that no other transport can handle—made loading and stowing easy. They *squared* the fuselage. They gave it straight sides, a level floor and a horizontal ceiling. They split the fuselage tail into two doors which open the full width of the hold. They placed another door forward for access to up-front space.

The result is an air freight transport that is *easier* to load than a boxcar.

Cargo can be walked directly from truck or loading platform straight into the hold—no right angle turns—to its allotted place on the floor. Straight-sided cartons snug up to the Packet's straight-sided walls like building blocks. Cases can be lashed down quickly to the recessed tie-down fittings placed every 20 inches on a floor designed for heavy loads.

Here, then, are facilities for speed *on the ground*, vital factor in the distribution of perishables; a major element in the establishment of profitable air cargo operations.

That is the inside story of the Packet. Fairchild engineers have again achieved "the touch of tomorrow" in a plane built expressly for the dawning age of "flying freight."

Fairchild Aircraft

Division of Fairchild Engine & Airplane Corporation, Hagerstown, Maryland

Pratt and Whitney 3,500-h.p. *Wasp Major* engines. Its top speed will be near the 350 m.p.h. mark and it is to cruise at 300 m.p.h. Range is to be 2,300 miles. This plane also is a double-deck creation. It will have nine staterooms with two berths each and 12 single berths, with the remainder of the accommodations in the form of reclining chairs. No estimate of cost is given since it is still under construction.

DOUGLAS GLOBEMASTER (DC-7). This airliner was designed to carry 96 passengers at a top speed of more than 300 m.p.h. and to cruise at 250 m.p.h. for a maximum range of 4,000 miles. Payload is 21,250 pounds and gross weight is 162,000 pounds. Wing span is 173 feet, length, 123 feet and height, 43 feet. It is powered with four Pratt and Whitney *Wasp Major* engines and was flown for the first time last September. The passenger version for airlines was to have a pressurized cabin, with an 8,000-foot pressure level to be maintained at 20,000 feet. The military prototype, however, is not pressurized. Cost of this plane was originally quoted at approximately $1,250,000 apiece but when the AAF ordered a cutback on its initial production order, the Douglas company was forced to boost the price to the airlines to more than $2,000,000 each, not including spares. This prompted one airline to cancel its original order of "up to 26" planes, with the result that the ultimate commercial status of the DC-7 remains unknown at the present time.

MARTIN MARS. Flying boats were replaced by landplanes in long distance over-water flights during the war, although the *Mars*-type flying boat continued to prove that this craft was an ideal transport in many ways. Consequently, the Martin company was inspired to design a craft for commercial operation. When fitted with seats, the *Mars* would carry 106 passengers. It would have a range of 4,000 miles with a payload of 35,000 pounds. The plane, weighing 80 tons, would have a wing span of 200 feet, length of 120 feet and stand 44 ft. 7 in. to the top of the single tail. Cruising speed would be slower than landplanes, or about 200 m.p.h., while the top speed is listed as "more than 225 m.p.h." That the *Mars*-type planes will go into production for the airlines is doubtful since various landplanes have the same range and more speed. Little interest has been shown by commercial lines in the passenger-carrying *Mars*.

BOEING STRATOCRUISER (C-97). This plane, which briefly held the transcontinental speed record, will accommodate between 70 and 100 passengers, fly at a top speed of 390 m.p.h. and cruise at 300 m.p.h. It too will be powered by four Pratt and Whitney 3,500-h.p. *Wasp Major* engines. Operating range is 3,500 miles with a payload of 35,000 pounds. Wing span is 141 feet, length, 110 feet and height, 33 feet. It has two decks and a pressurized cabin with the ability to obtain an 8,000-foot level up to 30,000 feet actual altitude. Empty weight is 70,000 pounds and gross weight, 130,000 pounds. The *Stratocruiser* is a direct outgrowth of the Boeing *Superfortress*. The wing and tail surfaces and landing gear are identical, although the *Stratocruiser* is 12 feet longer. The top section of the fuselage is longer than that of the *Superfortress* but the bottom section is of the same dimension. The plane can be used as a day plane with 100 passengers or as a luxury sleeper with 72 day seats or 36 berths, with the lower rear cabin fitted out as an observation, dining and cocktail lounge seating 14 persons. It may also be used as an all-cargo plane, featuring a drive-in ramp and capable of hauling 35,000 pounds of freight. The prototype already is flying and several airlines have placed orders with Boeing.

DOUGLAS DC-6. First of the long line of Douglas passenger planes to have a pressurized cabin, the DC-6 has recently flown for the first time. Two prototypes are being manufactured. One is designated the 477B, which is powered by four Pratt and Whitney R-2800 engines, each developing 2,100 h.p. The other is the 496B, which will be powered by four Allison inline V-1710 liquid-cooled engines, each rated at 1,630 h.p. at take-off. Experiments also were made on the wooden mock-up with jet units, although this project was abandoned. Either of these planes would carry 52 passengers but one version of the 477B would accommodate 70 passengers and another would be a long-range model carrying two 500-gallon wing-tip tanks. The 477B has a span of 117½ feet, length, 100 ft. 7 in. and height of 28 ft. 5 in. Gross weight is 81,500 pounds. Maximum speed is 300 m.p.h. and cruising 250 m.p.h. Service ceiling is 27,400 feet with best operating altitude set at 20,000 feet. The 496B would have a gross weight of 81,000 pounds. Critical altitude would be 22,400 feet and top speed 283 m.p.h. Range for both would be more than 2,000 miles and capacity payload for each would be 14,280 pounds. To date, the majority of airlines have favored the 477B series.

LOCKHEED CONSTELLATION (C-69). This plane, as delivered to TWA last November, has seats for 51 persons for cross-country trips and 43 seats for transoceanic passengers. Powering the craft are four Wright *Cyclone* engines, developing 2,200 h.p. at take-off. Top speed is 340 m.p.h. with a full load, or a gross weight of 90,000 pounds, and a cruising speed of approximately 300 m.p.h. Landing speed is 80 m.p.h. Maximum range is estimated to be about 5,000 miles. Wing span is 123 feet, length, 95 ft. 1 in. and height, 23 ft. 8 in. The cabin is pressurized and an outward level of 20,000 feet may be attained while the inside level will be maintained at 8,000 feet. This plane features a hydraulic power-boost control which reduces pilot fatigue and enables the plane to be handled more easily than other four-engined craft. A version known as the "Gold Plate" model will be produced late this year. It will be powered by Wright R-3350-BD1 engines, each developing 2,500 h.p. at take-off. Interior fittings will be much more luxurious. This is one of the planes to which the public will become accustomed. Cost is about $850,000 each.

DOUGLAS SKYMASTER (DC-4). This plane was an ocean-crossing pioneer, used extensively by the Naval Air Transport Service and the Army Air Transport Command. The commercial passenger version carries 44 persons with 5,000 pounds of cargo. Cruising speed is about 220 m.p.h. Wing span is 117 ft. 6 in., length, 93 ft. 10 in. and height, 27 ft. 6 5/16 in. Airlines already are receiving this plane, both new and reconverted models. It promises to become as familiar a sight to the public as the outmoded DC-3. Cost will be about $550,000 each, brought down to this figure because of the great number produced for the armed forces.

REPUBLIC RAINBOW. A costly creation, estimated at $1,250,000 each, this four-engined plane is scheduled to carry 46 passengers but at a cruising speed of nearly 400 m.p.h. or a top speed of 450 m.p.h. Power will be provided with four turbo-supercharged Pratt and Whitney *Wasp Major* engines, utilizing the full advantage of the exhaust jet thrust. Wing span will be 129 feet, length, 100 feet. Gross weight will be 113,250 pounds. The cabin will be pressurized.

In addition to these are the Fairchild *Packet* (C-82), which is a cargo plane but could be designed to carry 40 passengers; the Douglas DC-8, a revolutionary pusher plane, capable of carrying 48 passengers; the Martin 202, carrying 30 to 42 passengers; the Consolidated Vultee Model 110, which will haul 30 passengers.

There also is one other aerial vehicle to remember—the dirigible. At present plans are being made to develop large lighter-than-air craft to cross continents and oceans with less mechanical worries than those confronting operators of heavier-than-air planes. These latter may well be the true "king-size" airliners. END

The GOLDFISH CLUB

For information regarding membership in the Goldfish Club, pilots and aircrewmen should write Max Karant, Managing Editor, FLYING, 185 N. Wabash Ave., Chicago 1.

A listing of the Club members, a regular feature in preceding issues, is continued below:

141. Kenman, Donald, A
142. Miller, Dwight, A
143. Smith, Charles, N
144. Marquardt, Walter H., Jr. N
145. Stavole, Frank A., N
146. Fleniken, Leo R., Jr., A
147. Cook, Hazen, Jr., N
148. Broncato, Joseph, A
149. Turner, James M., A
150. Weinrub, Raymond I., N
151. Brown, Paul F., N
152. Durand, Joseph E., N
153. Conti, Andrew F., N
154. Wilson, Edwin M., Jr., N
155. Jespersen, Harry R., N
156. Eads, William, N
157. Ellis, R. M., N
158. Anderson, Francis Lee, N
159. Zienkowicz, Joseph J., N
160. MacLean, Walter D., N
161. Barr, Dale F., A
162. Gunnison, Justin C., A
163. Stevenson, James G., A
164. Yarbrough, Louis B., A
165. Felix, D. T., Jr., N
166. Seeley, C. E., N
167. Reynolds, R. J., N
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A—Army; N—Navy

★ SECTIONAL VIEW OF THE 52 PASSENGER DC-6 AIRLINER

OFF TO A *Flying Start*

in a dependable Douglas DC-6...the luxury airliner based on millions of flying hours transporting 80% of our airborne men, munitions and wounded, plus Douglas' years of prior experience building 80% of all air transports.

GREATEST NAME IN AVIATION

DOUGLAS DC-6

Sister Ship of the Famous C-54 Combat Air Transport

Contacts—New Eyes for the Airman

(*Continued from page 49*)

the gap in a letter "C" which is large enough that such gap creates an angle from the eye of one minute, or 1/60°, at a distance of 20 feet, he is said to have 20/20 vision.—Ed]

Chief reason for this higher rate of acuity achieved with contacts is that the solution used immediately behind the lens and in front of the wearer's cornea (window-pane of the eye) actually creates a new eyeball surface, nullifying any of the irregularities that tend to cause abnormal vision. Thus, after a cataract operation, or in cases where accident has caused an indentation or scar on the cornea, contact lenses will do a better corrective job than can be expected of ordinary glasses.

Even when there is no impairment of eye surfaces, the ordinary optical lens itself possesses certain irregularities. These irregularities are especially noticeable to the airman since their effects are magnified when observation must be made over areas covered with snow, over water, or over any surface that gives off a high degree of light reflection. Through their proximity to the eye surface, contacts minimize this particular defect of the conventional high-power spectacle lens.

By the same token, peripheral vision also is noticeably improved by use of contact lenses because peripheral rays of light are not refracted accurately by ordinary lenses and therefore are poorly focused. Contact lenses accurately focus peripheral rays from a visual field that is almost as great as the 170° range of normal eyes.

Perhaps the most important service contacts have rendered to airmen (in the light of current eye-test requirements) is the restoration of depth perception when single binocular vision has been impaired.

Single binocular vision is the integration of the dual images seen by the two eyes so that a single object is perceived. The important function of this process is the achievement of stereoscopic depth, the actual seeing of three-dimensional space. What this means to the observer is best illustrated by comparing the flat image of a conventional photograph with the three-dimensional impression one gets from viewing specially prepared photos through a stereoscope.

The physical requirements for three-dimensional depth of vision is that both eyes be aligned on the same object and that the two images seen be alike in clarity, size, shape and color. If the images are unlike in any of these respects, stereopsis (or three-dimensional depth perception) is lost and the observer is limited to a flat, two-dimensional experience.

Thus, when a potential pilot who lacks stereopsis is tested by a simple screening device such as the "pins-in-a-box" test, he is unable to align the pins because he sees them in only two dimensions.

There are, as has been pointed out, impairments to the eye which result in image size differences that can not be corrected to permit depth perception by use of ordinary glasses. For instance, even a young adult may develop a monocular cataract through injury or shock. When the cataract is removed, the image size difference between the two eyes when ordinary glasses are used is often greater than 25 per cent. In many of these cases, however, contact lenses can equalize the image and restore depth perception.

It is entirely possible, therefore, that a prospective pilot who wears ordinary lenses may fail a CAA exam that he could pass with contact lenses. But their superiority in cases of cataract, irregular astigmatism, conical cornea (center protrusion of the cornea) are only the more dramatic services which contacts offer the flyer. A pilot who has worn such lenses for several years summarizes their more practical advantages in the following list:

(1) Side vision is much better. It is unnecessary to turn your head in looking from side to side as with ordinary glasses—roll your eyes and contact lenses roll with them.

(2) Prop wash does not affect contacts; regular glasses often are blown off the face.

(3) Eyes are protected from dust particles and steel shavings which accumulate on the plane while it is in repair shop or hangar. Contact lenses protect the eyes almost like a watch crystal protects the face of a watch.

(4) If your face should hit the instrument panel or windshield there is less danger of injury to the eyes. The plastic lenses do not shatter and they keep broken glass from entering the eyes.

(5) If it is raining or snowing and the cockpit is leaking (or the windshield has been broken by a bird) ordinary glasses quickly become spotted and useless. But contact vision is even better than that of the normal naked eye which is sensitive to wind and rain.

(6) Should smoke or fumes develop in the cockpit, the contact-protected eye can withstand their effects better than can the naked eye.

(7) The jerk of a parachute's opening will tear ordinary glasses right off a pilot's face. Not so with contacts.

(8) Ordinary glasses will "fog up" when a flyer enters a warm cabin or during sudden altitude changes. Merely blinking the eyelids keeps contact lenses clear.

(9) The frames of ordinary glasses are easy to bend out of shape. In some instances the results are serious, even causing double vision. Contacts have no frame to bend.

Of course, the picture presented by contacts is not entirely a rosy one. One important item is cost. While price varies, a set of contacts usually costs in excess of $100 plus additional professional fees that range from $25 to $75, depending on the charges of the doctor and the nature of the ailment.

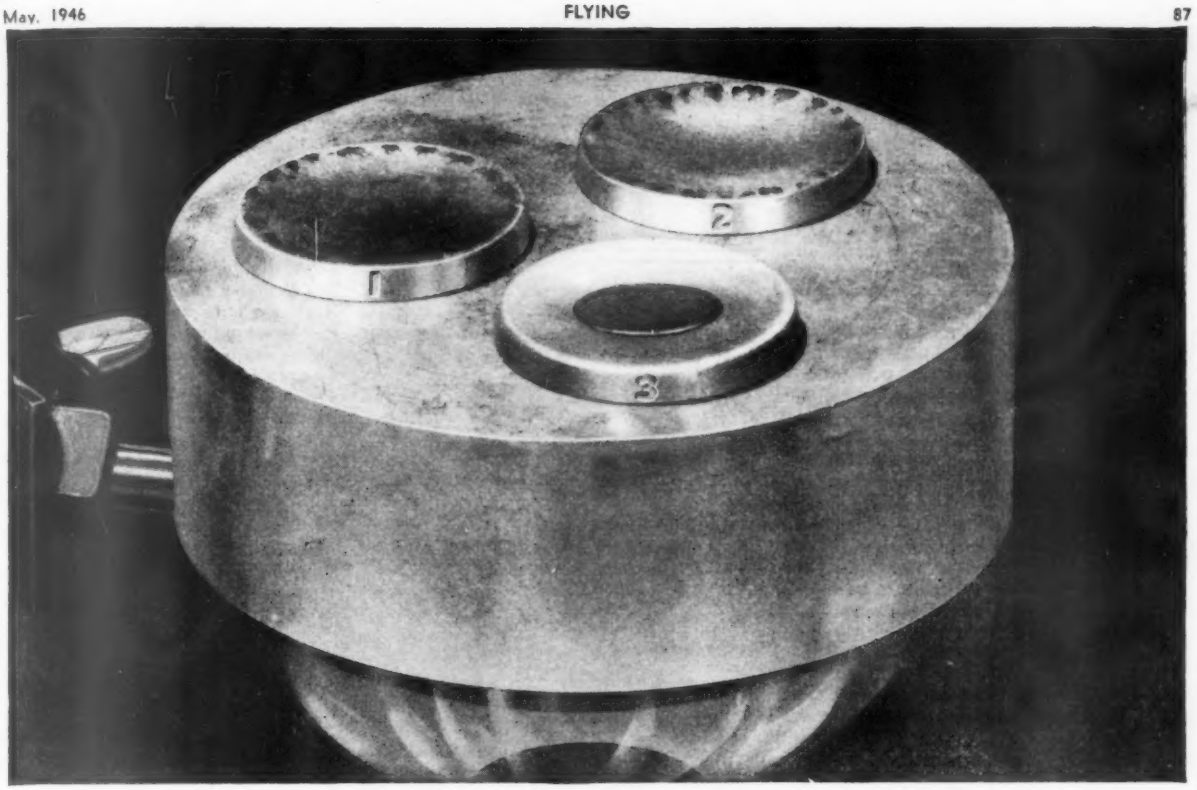
Another problem that originally caused trouble was fitting each eye with a lens precisely molded to size. This problem, however, has been solved largely through so-called "impression" and "trial case" techniques. In the impression method, a mold of the eyeball is taken and a die made for casting the lens. The trial case technique is to test the eye with several

HIGHWAY JET TAKE-OFF

FORCED down in a West Virginia farmer's pea patch, an experimental AAF *Shooting Star* was ferried on a Naval barge, towed behind a truck and finally flown off a highway during one of the oddest ferry missions in Army history.

Urgently needed at Wright Field, the P-80 would have taken too long to arrive if it had been dismantled for shipment. However, a highway near Pomeroy, O., offered a take-off strip, and the plane was hauled there by truck and barge.

Maj. R. E. Schleeh, chief of the Fighter Test Section, marked off the road and draped flags over obstructions to be avoided in his take-off. The jet plane ate up 2,000 feet of road before it took off, just clearing a telephone wire.



What happens when aviation oil is fried?

It all depends upon the oil — and notice how the oils in the dishes numbered 1 and 2 can't stand the broiling they're getting on this hot plate. They've run away from the hot spot — cooked up into gum and varnish. In a motor, that means sticky valves, pistons choked with carbon.

Now look at the RPM Compounded Aviation Oil in the third plate. Heat and air don't faze it; "RPM" leaves no gum and varnish to mess up a motor. And it works even better in engines because it contains a detergent (or cleansing agent) which removes old deposits, keeps engines cleaner. Other compounds in RPM Aviation Oil prevent corrosion, sludge and foaming, too, and make "RPM" cling to hot spots most oils leave bare.

"RPM" is an oil without a weakness. That's why it will increase the time between overhauls, and give you happier air hours when you pick it for your own plane.

Two great products of petroleum research

RPM AVIATION OIL

CHEVRON AVIATION GASOLINE

take better care of your plane

CHEVRON NATIONAL CREDIT CARDS

for private flyers are good at airports throughout the United States and Canada. Write Standard of California, 225 Bush Street, Room 1618, San Francisco 20, California . . . or ask the Standard dealer at your field for an application blank.

STANDARD OF CALIFORNIA

lenses that have been pre-fabricated according to graduated mathematical formulas until the right size is found.

But the greatest problem delaying mass use of contact lenses is that of finding a universal buffer fluid of exactly the right concentration and alkalinity to give each patient perfect comfort and the longest period of clear vision. This buffer fluid cushions the cornea from direct contact with the lens and corrects virtually all imperfections in the curvature of the eye. But, should the fluid have either an excess or a deficiency of alkalinity, it produces smarting or burning sensations and lachrymation (tears). This results in a diffraction known as "Sattler's Veil" or "Fick's phenomena" which is seen by the patient as a gradually increasing haziness of vision, with colored three-dimensional halos appearing around lights such as match flames or unshaded light bulbs.

These diffraction phenomena, which are similar to the "blurriness" of vision experienced by swimmers who stay in the water too long, disappear soon after the lenses are removed and produce no after effects. But, until buffer fluids can be standardized and Sattler's Veil can be controlled within limits which fit wearing needs of the individual patient, there will remain an element of uncertainty in the use of contacts—especially by airline or military pilots who cannot risk a blurring of vision in the midst of a long run. It is significant, however, that Dr. Albert J. Herbolsheimer, Assistant Director of the Aviation Medical Division of CAA, makes this evaluation of contact lenses:

"Although professionals still regard contact lenses as being in an experimental stage and although there are no reliable standards by which to judge their sustained effectiveness, we regard them in the same category as ordinary glasses so far as testing of pilots' vision is concerned . . . They undoubtedly are effective in rectifying visual inadequacies and we do not oppose their use by pilots . . . Chief question mark concerning their sustained effectiveness is the varying ability of individuals to wear them, some having to take them out at the end of two hours while others can wear them for a 36-hour stretch or longer."

Actually, the average person starts wearing contacts from two to four hours a day. Later this period can be increased to as long as 48 hours. In one case, a girl wore contact lenses five hours the first day and eight hours the second. Now she wears them about 16 hours daily. Normally, a 50 per cent increase in wearing time may be expected in the first six months.

This ability on the part of patients to lengthen wearing time and, in many cases, actually to eliminate the occurrence of Sattler's Veil, has led some authorities to believe that the problem is psychological. Dr. Eugene Freeman, of Chicago, one of six or seven optometrists in this country whose experience with contact lenses admits their being classified as authorities, reports the case of a pilot who quickly achieved the ability to wear his lenses for eight to 10 hours without changing the fluid. He experimented with a number of fluids, finding the one most suitable to be a mixture of 15 grains of sodium chloride (salt), a level teaspoon of sodium bicarbonate (baking soda) and five ounces of distilled water. He wore his lenses continuously with the fluid for as long as 46 hours. Later he reported a curious phenomenon. He noticed that his vision began to cloud at about the sixth hour and that the cloudiness increased somewhat up to the 10th hour. But after that time, without changing the fluid or removing the lenses, the blurring decreased rapidly until it was no longer noticeable. Dr. Freeman suggests that the phenomenon can be accounted for only on the basis of a psychological or an actual physiological adaptation.

Further evidence that a final solution to the problem of Sattler's Veil is possible, is indicated in a case study made by Dr. K. Clifford Hall, of London, early in 1944. Dr. Hall states that one of his patients "reinserted his contacts two hours before landing in the van of the [Sicilian] invasion and did not remove them until the last German was dead, prisoner, or had escaped to Italy—24 days! He swears this is true . . . He tells me he had no Fick's phenomena (Sattler's Veil) and no discomfort in spite of the bright light. He now has his wings as a pilot in the Army Co-operation Corps and the authorities failed to detect his lenses."

Such evidence seems to indicate that under stress of necessity wearing limits of contacts can be greatly extended. There are innumerable stories of contact wearers who achieved AAF classification and went through preflight, primary, basic and advanced training with no one the wiser. Many of those whose contacts were discovered were tripped up through no fault of the lenses but through their detection by the trained eyes of examining physicians.

Actually, the use of contact lenses is not new. Aristocrats attempting to escape during the French Revolution often had semi-opaque irises painted to disguise eye color. They were crude glass affairs that were not devised as visual aids. In 1827, the English astronomer Sir John F. Herschell proposed that such eye coverings might be used to protect the cornea of the eye from cancerous eyelids. But it was not until 1887 that a Dr. Saemisch had a contact lens devised for a patient who was threatened with loss of vision. The patient wore the lens successfully for over 20 years, retaining useful vision until the time of his death. In 1888, Dr. A. Fick, of Germany, used a contact lens for the correction of conical cornea.

The first cast of the human eye for individual fitting of lenses was made in 1932 by the Hungarian physician, J. Dallos. He made a negative mold of the eye with a material known as negocoll. From this a positive cast was prepared of a paraffin-like substance called hominit.

Dr. William Feinbloom, a New York optometrist, basing his investigation on the work done by Dallos, devised lenses with a plastic rim to which was welded a glass center incorporating the optical correction. After making impressions of several hundred pairs of eyes, Feinbloom devised the "trial case" of stock lenses.

With the production in 1936 of the synthetic plastic resin polymethyl methacrylate, Theodore E. Obrig, of New York, introduced an all-plastic molded contact lens. Since that time the chief advance has been introduction of alginate compounds in the making of eye impressions. These make possible the taking of impressions without administering anesthetics.

Easy to wear, safe, and often more accurate than the normal eye, modern contact lenses open new vistas for would be pilots of poor vision. The fact that RAF, RCAF and *Luftwaffe* pilots were permitted to use contact lenses indicates that a career in military aviation may yet be possible for the American boy of sub-normal vision. Certainly that should be true once the final contacts problem—wearing time—is solved. And experts think they'll have that solution before long. END

15 YEARS AGO

FROM the May, 1931, issue of this magazine:

A flight around-the-world in 10 days, to break the record of the *Graf Zeppelin*, was planned by Wiley Post with Harold Gatty as navigator.

Liquefied colloidal graphite fluid that protected motors against loss of lubrication and greatly increased the flying range of planes, was being tested at Wright Field.

Ruth Nichols had set a new women's altitude record of 28,743 feet, flying over New York City in a Lockheed *Vega* monoplane with a 600-h.p. supercharged *Wasp* engine.

The Royal Air Force was testing a new single-seat fighter equipped with six machine guns instead of the usual two. Powered by a supercharged radial 480-h.p. Bristol *Jupiter* engine, the fighter had a top speed of 194 m.p.h. and a ceiling of 26,100 feet.

Inland Aviation Company had started production of the *Super Sport*, a two-place, side-by-side monoplane, powered with a 110-h.p. Warner *Scarab*. Price: $4,850.

Hovering a few feet above the deck of the liner *Ile de France* in an autogiro, James Ray of the Pitcairn company successfully passed a package to the captain of the liner while it was cruising at sea. The transfer was the first of its type ever attempted.

To meet the demand for swifter transportation of freight, Junkers designed the Ju-52 for long distance flights. A monoplane, powered with a single 700-h.p. engine, the Ju-52 had a wing spread of 80 feet and could carry a pay load of three tons.

A fighting plane on the Navy's secret list was said to have attained a speed of 300 m.p.h. and an altitude of 29,000 feet. It was powered by a new-type air-cooled engine and was equipped with two machine guns.

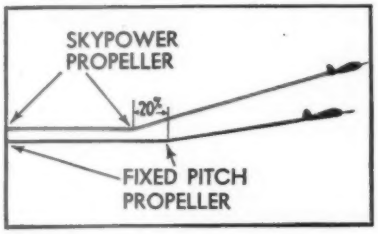
Swanson Aircraft Company introduced the Swanson *Coupe*, a two-place cantilever cabin monoplane. Excellent vision was obtained because of a special wing truss which eliminated use of a front spar passing through the cabin. Price of standard model, $4,450; de luxe (equipped with electric starter and other accessories) $4,985.

HERE'S WHY YOU'LL WANT A CONTINENTAL AVIATION SKYPOWER PROPELLER ON YOUR PLANE

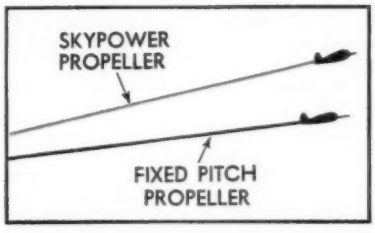
For thrilling new performance — the kind you pilots dream about — you'll want a Continental Aviation Skypower Propeller on your plane. It's the first hydraulically operated controllable pitch propeller for light aircraft in production. It means shorter take-offs, higher ceilings, increased rate of climb. It's simple in design and operation, low in price, and easy to install and maintain. Now in production for use with Continental A-65 and C-75-85 engines. Write to Continental Aviation and Engineering for literature.

NOW—A HYDRAULICALLY OPERATED CONTROLLABLE PITCH PROPELLER FOR LIGHT PLANES

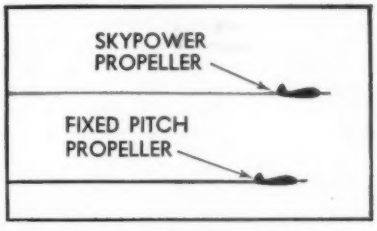
The Continental Aviation and Engineering **Skypower Propeller** operates from the regular engine oil pump pressure, on a closed system, without packing glands or gaskets. No spinning hydraulic parts. **Positive action for high and low pitch.**



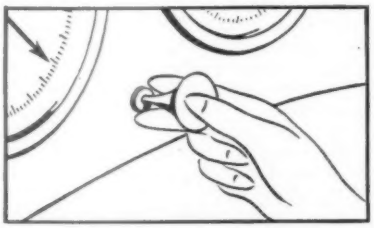
SHORTER TAKE-OFF — Use of the Skypower Propeller reduces take-off runs as much as 20% or more, permits you to land on or take off from smaller fields.



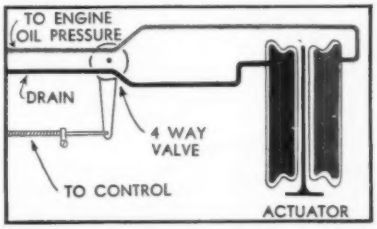
INCREASED RATE OF CLIMB — Tests with Skypower Propeller indicate as much as 27% or more improvement in initial rate of climb, giving new, higher performance to your plane.



THE SKYPOWER PROPELLER brings higher ceilings or greater load capacity, as well as new fuel economy, to all personal planes. New horizons for your flying.



SIMPLE PUSH-PULL CONTROL on panel shifts prop to low-pitch angle for take-off and climb, high-pitch angle for cruising.



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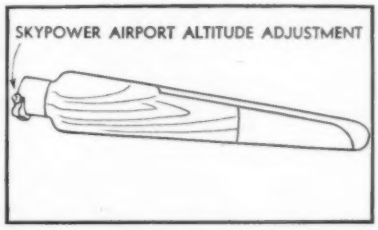


SPECIAL SKYPOWER BLADES are designed for high performance. Accessible control permits blade adjustment to local airport altitude for maximum performance.

CONTINENTAL AVIATION AND ENGINEERING CORP., Muskegon, Michigan

Dual Is Insurance

(*Continued from page 39*)

tomer I was talking to proved.

When Jim came back in the PT, the stranger and I climbed in and began a ride the like of which I had never seen in 1,500 hours of Army instructing.

He started the engine on left mag and left it there until I switched to both. He taxied with his head in the cockpit, began to make a pre-take-off check at the upwind end of the runway, and probably would have taken off downwind if I hadn't mentioned it.

At the downwind end of the runway he made no check at all and charged into the air after swerving and bouncing through the take-off.

We climbed straight away at full throttle; I had to pull it back. The climb was aimless and the airspeed ranged between 60 and 110. Finally we leveled off—I guess. It was hard to be sure, the way the altimeter crawled up and down.

But the customer enjoyed it. He was sticking his jaw out into the slipstream now and grinning. I could imagine just what he was thinking:

"Ah! This is the life! This flying stuff is great!"

We circled over his house and gained 150 feet. We circled again and lost 200. We started back and he couldn't find the field until I showed it to him. He made a sloppy pattern and lined up with a crooked taxi strip that cuts across the sod drome. I had to take the controls and line him up with the runway.

He was too high on his approach and so he dove to get in, ignoring of course, the increased airspeed. Naturally when we touched down we bounced 30 feet in the air and he sat quite shocked and immobile, the nose pointed heavenward and the airspeed trickling away. At the last moment I seized the stick, rammed the throttle all the way forward and sawed the rudders. We staggered across the field and into the air.

He was determined not to overshoot or bounce the second time and landed a full 20 feet in the air with flaps down. Again I waited until the last minute, hoping he'd correct the landing himself. When he did nothing, I frantically mushed it down with stick, rudder and throttle.

"Those landings weren't so good, were they?" he said as he clambered out awkwardly. "But I got it down okay the last time, didn't I?"

That's what the man said. I wondered what I'd been doing with the controls.

"Look, fella," I said quietly, "I'd like to talk to you a few minutes about your flying."

"Fine! Fine!" he replied. "I'll be back in a few days. Gotta rush off now. See you again soon." Grinning proudly he hurried over to a car full of waiting, awed friends.

I shrugged and went over to tell Joe he'd better give the guy several hours of dual before turning him loose with his, Joe's, airplane. I described the ride. Joe smiled.

"You're just getting a sample of some instructing," he said.

"Why don't you give fellows like that more dual?" I asked.

"They don't think they need it after solo."

"Convince them," I stormed!

Joe smiled wryly. "We try, but I guess they think we're just trying to make money. They get the airplane up and they get it down. In between they seem to stay out of trouble. They can't see their own mistakes so they figure they're doing okay."

I decided, before making any rash statements, to check further. In ensuing weeks I flew with several of the "old timers" around the field, casually, not as an instructor. Their time ranged from 20 to 400 hours.

Every single one, tyro and veteran, made mistakes that should and could be corrected. One looked only to the left while in the air, never to the right. It's a bad habit found around fields where only left-hand traffic patterns are used.

Another leaned his elbow continually on the left side, his body slouched with it and the left wing was continually low. A third never used trim tabs, never even checked them. A fourth made five successive turns into the final approach nose high, with the airspeed wavering. Not one out of five flew an exact pattern and their altitudes varied clumsily.

Many of these are minor errors, none dangerous by itself. But they are sloppy flying habits that can and should be eliminated. I'm convinced now it's not rash to state flatly:

"Dual is life insurance and not one civilian pilot out of 10 is getting enough of it!"

The Army and Navy recognized the value and the sheer necessity of dual when training pilots and so did the CAA in its controlled courses. All required an abundance of instruction and turned out good pilots. But for some queer reason, perhaps a distorted sense of economy, the ordinary pilot buying time quits his instructor the day he soloes. And his flying shows it!

I'm as guilty as the rest. When I learned in 1940, I soloed in eight hours. I never flew again with my instructor until I was ready for a private license test and then I asked him to check me for 30 minutes. I got the private and never took another minute of dual in 150 hours until I entered a CAA instructor refresher course that led to flying for Uncle Sam as a basic instructor.

But I know now it was wrong and that the dual I got in CPT and the Army was the only thing which kept me from becoming equally as careless, over-confident and sloppy as many I have found recently. I realize now how little I know about flying. It was demonstrated recently.

When I left the service, even though my CAA rating ran from zero to 5,000 h.p., I had Joe re-check me in a *Cub* and then the *Cornell*. He was able to point out that I wasn't using full throttle on take-off (you seldom do in high-powered military planes), that I was forgetting carburetor heat entirely, and that I was jamming the stick forward unnecessarily hard in spin recoveries, as we taught in military training planes.

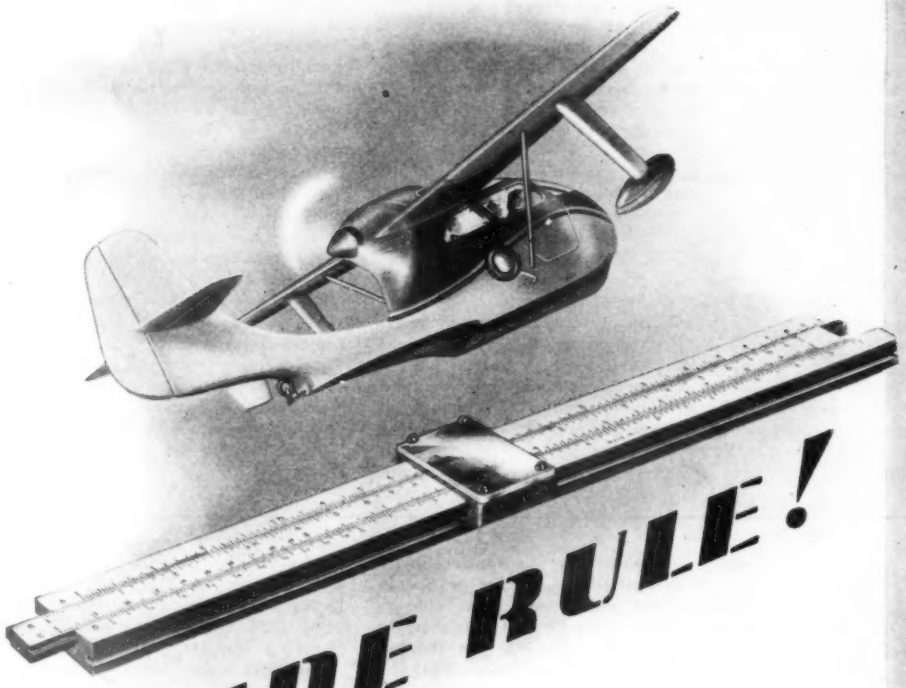
I made those mistakes after 2,000 hours in light, medium and heavy aircraft, after day and night and instrument flying and, even worse, after 1,500 hours of instructing. See what I mean? You *never* reach a point where dual is unnecessary.

Dual is life insurance. Buy it! Don't abandon your instructor. You're not hurting his pocketbook and helping yours. There are tricky pitfalls in the air that no man with only eight hours of dual can recognize.

How much dual do you need? That's

FLYING

". . . Furthermore, Burton, if you don't stop fooling around with that redhead from down below, you'll never get your wings!"



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an impossible question to answer in a general way because it depends on many things and many questions. What will you fly? How much horsepower? How frequently? Single- or multi-engined? Contact exclusively or instrument flying as well?

Assuming you're starting on lightplanes and staying with them at least the first 200 hours, I would suggest a dual check every fifth hour after solo until you reach 50 hours, then every 10th hour to 100 hours, then every 20th hour to 200, or until you decide to go into heavier or more complex equipment.

Work it out with your instructor. He'll be overjoyed, not because your few additional dollars will go into his pocket, but because he has, at last, found a rare and delightful bird, a tyro who admits he doesn't know all there is about flying after eight hours.

After 200 hours you won't need a rigid schedule to follow because you'll find instructors pointing out so many little mistakes you never dreamed you were making that you won't think of going without that friendly re-check periodically. You'll want it because you, yourself, will realize you need it.

Equally as important as an intelligent program of instruction is judicious and economic use of solo time. Plan your flights and get the most out of them. Most important of all, discipline yourself to everlasting precision. It's a natural inclination when, once rid of your hawk-eyed, critical instructor to relax and think:

"At last I can enjoy myself. I can fly as I please."

You can and you do. Your airspeed wanders, your turns are sloppy, your altitude erratic. You stop looking for other airplanes and gawk at the scenery. Gradually that aerial slovenliness becomes habit and flying habits are no easier to break than any other kind. Bad ones are much more deleterious to the general health and welfare. Practice precision and make precision a habit. Get your full money's worth out of every practice flight.

Take off ruler-straight, as though your strip is no wider than a one-lane highway. Climb at an unwavering air speed. Make climbing turns a precise 90° or 180°, not aimless circles. Use correct throttle settings and, above all, use the trim tabs. The more horsepower you progress to, the more trim tabs become a definite, vital control. Develop the habit of using and checking them. More than one military pilot got into trouble because he forgot to check tabs before take-off.

Make level turns level. Hold the altitude within 20 feet. Fly an exact, precise pattern. Shoot every landing at a predetermined spot and not at any place on a 4,000-foot runway. Make every prelanding glide with uniform, correct airspeed—a habit you may need badly some day in trouble.

It won't be long before you do all those neat, precise, correct things habitually and that's important.

My living comes out of a typewriter, not an airplane. Financially I don't care a nickel's worth how much instruction you buy. It means nothing to me. But I assure you it means a lot to you, and to your flying! END

Poacher Patrol

(*Continued from page 71*)

relied on dog teams and river boats for patrol transportation. Automobiles, except near the few roads are practically out of the question. Then, in 1929, Game Agent Sam White decided to fly his own Swallow biplane on a patrol. The airplane's open cockpit was cold, but it was faster and more comfortable than mushing behind a dog team.

Sam, now a deputy U. S. Marshal, had little trouble convincing his superiors of the value of aircraft for the patrol work. Figures have since shown that, considering salaries and operation costs of dog teams or boats, airplanes offer cheaper transportation per mile.

For 10 years following Sam's suggestion, the Department of Interior authorrized the rental of aircraft from Alaskan operators for use by pilot agents. Then, in 1939, it purchased two Fairchild F-24's and later two Monocoupes. Recently, the Game Commission was given two Noorduyn *Norsemen* purchased from the RFC and now hopes for six amphibians. Three will be small, on the order of the Republic *Seabee*, and the others near to the Grumman *Goose* in size.

A special brand of pilot is needed for flying poacher patrol. He has to know the country as well as or better than a trained guide. In these latitudes the compass points almost directly east during those moments it is being reasonably accurate. Pilots fly contact and they must know the terrain perfectly.

On the trip from Anchorage to Bristol Bay there is a pass through the mountains about 35 miles long which saves a pilot 75 miles if he decides to use it. The pass, in reality a canyon, is so narrow that there is seldom more than a 50-foot clearance on either wing tip. It is not a straight pass and turns have to be made precisely without slip or skid. Until recently the pass was a potential deathtrap if the pilot ran into fog or clouds. Game agent pilots were good rule-of-thumb weathermen, for that canyon never marred their safety record. Now there is a U. S. Weather Bureau station near the canyon's mouth which is supposed to inform pilots when they can expect their shortcut to be blocked.

To get the type of pilots they want, the Game Commission either has to hire experienced Alaskan flyers or, what is more usual, train their own. According to Frank Dufresne, former Alaska Game Commission executive officer now with the Interior Department's Chicago office, it takes about a year and a half of on-the-job-training to turn a ground agent into a flying lawman.

"We usually send a pilot-to-be up with a trained man and let them cover their territory together. The new man gets to know what the country looks like from the air and, of course, gets in a lot of stick time," Dufresne explained. "By the time the novice has spent a few months in our planes he can usually take off and land and travel over most of the country. He then enrolls in a flying school some place in Alaska, logs the required hours for a license, and takes CAA tests.

"Once he has his ticket, the man goes back to flying patrol and gradually develops into an Alaskan flyer. He picks up bits of mechanical knowledge as he goes along and also becomes a fairly good mechanic."

Some of the men are sent to mechanical schools where they learn more about the maintenance of their airplanes, for no man is hired by the Game Commission unless he can prove that besides handling the plane, he can also be its mechanic.

Fabric repair kits are standard equipment and, according to Dufresne, "some of the planes have wings that look like patch-work quilts by the time they are sent to Seattle for their major overhauls."

The only time that anyone but the pilot works on the airplane, incidentally, is during overhauls. Spare engines are kept in stock and when one wears out the pilot-mechanic yanks out the old one and installs the spare.

Sam White denies the story often told about his flying an airplane on animal fats. He claims that he only witnessed the incident. He was riding with another pilot who had to make a forced landing when his plane developed an oil leak. The pilot fixed the leak and then, rather than borrow a dog team and mush back to the base for oil, borrowed moose fat and bear grease from a native. He boiled down this mixture and poured it into the oil tank, took off and flew back to Fairbanks. There are no reports of the engine being any the worse for the experience.

Such improvisation is all part of the flying Alaskan's life. There have been many instances of split propellers being fixed with on-the-spot repairs. Most airplanes used in Alaska have wooden props and the usual emergency repair is to cut away the splintered portion of the prop with a hunting knife, then whittle down the other side until the propeller is balanced. Pilots then fly the plane until there is a chance to install a replacement.

Chief of Game Management Winney E. Crouch remarked that the Game Commission may soon have to hire or train several new men as pilot-mechanics if the Alaskan airlines don't stop hiring away their flying I-Men. During the war, Game Commission pilots proved that getting Alaskan pilots was a difficult proposition. The Army and Navy had to send in stateside-trained men to fly the bombers and patrol ships and it was often the game agent who saved the military's neck. It became the practice for military or Naval pilots to call for help any time they got lost. A game agent pilot would have to go out over the tundra and, finding the soldiers or sailors, lead them back to their bases.

Dufresne claims that the flying game

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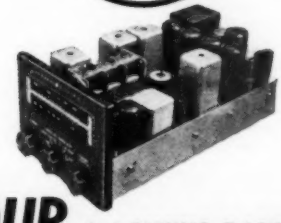

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agent can follow a trapper's line by air as well as a man on the ground, and tell by buzzing a trail exactly what animals have been using it. Agent Grenold Collins once recognized a marten trap line staked out during closed season. He reported the line by radio and said he was going down to make an arrest.

Flying down the line of traps he spotted the trapper, noted the general direction he was traveling, passed over the man and landed on the far side of the trapper's cabin. Going into the cabin, Collins took stock of the food available and started dinner. He had it ready on the table when the trapper walked in.

"No sense trying any funny stuff," Collins warned the man after pronouncing him under arrest, "for I've already told my base I'm here and they'll be looking for you if I don't show up."

The two settled down to dinner and then swapped yarns until time to go to bed. The next morning the duo walked along the line snapping the traps, loaded the airplane with skins the trapper had taken and took off for a flight back to the base.

Recently, Interior agents stepped into a smuggling case at the request of the Northwest Mounted Police. The Mounties had a line on a group that were smuggling coyote and wolf hides across the border. Canada doesn't pay a bounty on wolf and coyote hides and Alaska does. The trip was made to collect bounty money, since the hides would bring about the same price on either side of the border.

Flying up and down the border, game agents spotted the trail of the smugglers and followed it until they located the men whose location was reported by radio. Deputy agents closed in with dog teams and the smugglers were quickly nabbed.

Time was, in a land which is desolate for miles, that shady characters could operate out in the open with little worry about detection—but that was before the airplane. One old character, long suspected of poaching, was nabbed through aerial detective work. Indignant at the arrest he wrote Dufresne a long letter complaining of unsportsmanlike treatment "I can out-dog team, out-snowshoe and out-run any agent on the ground," he griped, "but I'm getting old now and you spring those flying fellows on me . . . It ain't fair."

But the air patrol keeps flying and checking on the activities of men and beasts. Once Agent Jack O'Conner was flying a mission that took him over Clark Lake. Spotting a coyote running on the snow-covered ice, he buzzed the badly frightened animal three times before he killed him with a blow of one of his plane's skis. He then landed, skinned the animal, tossed the pelt in the cabin and flew back to his base.

In winter most of the airplanes are mounted on skis. Some, Dufresne says, keep the ski mounts on during summer if operating in territories where there are extensive mud flats. Mud is a good runway material for skis.

One commercial pilot, Bob Reese, had a contract that kept him on skis all year around. He was ferrying supplies from Anchorage to a mining camp up in the mountains near a glacier. He would take off on the mud flats, buzz a lake on the trip up to wash off the skis and land on the glacier at the mining camp. The Game Commission planes take wheels, skis or floats.

Extra gasoline tanks are installed in all the game agents' airplanes to give them additional mileage. When the agent takes off he has full tanks and flys until his tanks are practically empty. He then lands at a trading post for gas and a night's rest. As a rule, most trading posts have aircraft gasoline as a standard item of stock. There are many Indians and Eskimos, Dufresne says, who are reasonably good airplane mechanics but have never seen an automobile or railroad train. To them trains and automobiles are something out of picture books.

"Indians," Dufresne remarked, "are almost the most air-minded group of people you'll find any place. They love to fly but I've never heard of one who was a pilot . . . I've known cases where a whole Indian village will hire an airplane for a couple of days to attend a *potlach.*" (Indian parties where one village will visit another with food and gifts one year and then await for the next when the visited village is supposed to return the compliment.)

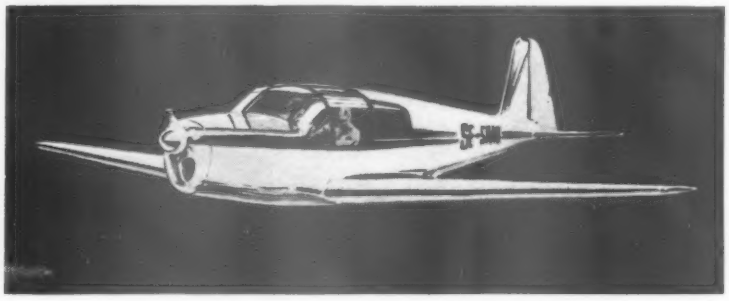
Both Game Commission and commercial or private pilots always drop what they are doing when an emergency call is radioed in Alaska. While doctors and dentists often make their rounds by plane and many trappers and miners get their supplies by air, when news comes of someone badly needing a doctor or food, there is always an airplane ready to go to the rescue. Commission planes have hauled women to the hospital in a cross-country race with the stork and as far as anyone knows have always beaten the bird to the medics.

While the game agents' airplanes rolled from the factories primarily as passenger planes, they often are loaded with dogs, supplies or tools. Alaskan pilots feel that if they can get the load into the air they usually can deliver it.

Prime equipment for the Alaskan pilot is a two-way radio, a smoke pot and a small kettle. The radio is his only means of communication and the smoke pot and kettle the only way of starting a plane. An agent, or any other Alaskan pilot, immediately drains the oil from his engine into the kettle on landing in low temperatures. When it is time to take off, the pilot starts the smoke pot under the engine to warm the grease and puts the oil on the stove to boil. When the oil is good and hot, it's poured into the tank and the engine started. If the engine doesn't start too quickly, sometimes the procedure has to be repeated.

A two-way radio once saved Agent Pilot John Walatka and another agent from a long trek when their Monocoupe broke its propeller shaft while flying over the Bristol Bay country. They made an emergency landing and called in for help. Another agent pulled the shaft from a spare engine and flew it out to Walatka who made on-the-spot repairs and flew back to his base.

The Alaskan Game Commission has been conducting a campaign among trappers and hunters for the past several years trying to convince them that killing out of season actually is reducing future wildlife bags and, Dufresne adds, "the swift arrests handed out by the flying agents have proved to would-be offenders that it's better to be good than a convict." END



SWEDISH LIGHTPLANES

THREE lightplanes have been offered by Swedish aircraft builders since the war's ending, but while their performance figures are high, so are their prices.

Two planes, a single-place and a side-by-side, are built by Skandinaviska Aero for $7,500 and $8,000. Both have mechanically retractable landing gear and automatic pitch propellers. Sixty-, 83- and 105-h.p. engines are available for the single-place. With 60 h.p. this plane cruises at 120 m.p.h. and dives at 350 m.p.h. The two-place model (shown above) has 165 h.p., cruises at 140 m.p.h. and has maximum speed of 154 m.p.h. Both have 50-m.p.h. landing speed and 22,000-foot service ceiling.

Svenska Aeroplan Atkeibolaget offers a two- or three-place plane for under $7,000. This plane may have 128-, 138- or 150-h.p. engines, cruises at 132 m.p.h., lands at 36 m.p.h.

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General "Tooey"

(*Continued from page* 33)

existing records, remained in the air 150 hr. 40 min. 15 sec.

Two members of Tooey's crew were Maj. (now Lieut. Gen.) Ira C. Eaker and Lieut. (now Maj. Gen.) Elwood R. Quesada. They whiled away their time in the sky by playing a marathon game of stud poker.

When the *Question Mark* landed, a cheering throng was on hand to hail the endurance heroes and pretty, loquacious Mrs. Spaatz, accompanied by Becky, then six, was in the forefront of the crowd.

"Wave to your daddy, dear," urged Mrs. Spaatz as the bewhiskered Tooey clambered from the plane. "He's been up in the air four days. Isn't it wonderful?"

"I won't," said Becky. "I think it's just dumb."

Despite Becky's uncomplimentary opinion of the project, her daddy was given the Distinguished Flying Cross for his part in the feat.

Tooey was graduated from the Command and General Staff School in 1936. In 1940, by this time a temporary colonel, he was sent to England as an observer. He came back to the United States with an extremely realistic viewpoint about the supreme importance of air power in World War II and a disgust provoked by the messy pattern of the German blitz. Tooey, in softening up the French invasion coast four years later, was to give Hermann Goering a lesson in the "neatness" of destruction. Pearl Harbor, of course, did nothing to change Tooey's opinion about air power.

On the day the Japanese blasted the Pacific fleet, Spaatz was enjoying a peaceful Sunday in the new home at Alexandria, Va., he and his family had waited 25 years to buy. The telephone rang, he answered it, grabbed his hat, and raced to his office in the Munitions Building, being at that time head of the air forces material division. For weeks he lived at the office, sleeping on a cot next to his desk.

Five months later, Tooey was a major general commanding the air force combat command and was sent to England to prepare for the American bombing of Germany. His superiors were somewhat fearful that the matter-of-fact Spaatz would prove too outspoken for the suave British. However, the British took an instant fancy to this business-like American who recognized their problems and did not announce loudly that the AAF would blast Berlin off the map in one tremendous swoop.

Moreover, Tooey established a reputation for a Walter Raleigh brand of gallantry. During a visit by Queen Elizabeth to the 8th Air Force headquarters, a sudden downpour trapped the queen while she was inspecting aircraft. Tooey whipped off his two-starred coat, draped it around the queen's shoulders and announced: "Madame, you are now a major general in the United States Army." The queen laughed and thereafter had a special twinkle for Tooey every time she saw him.

By August, 1942, as commanding general of the 8th Air Force, Spaatz had enough aircraft and trained personnel to begin hitting Germany. He wanted desperately to lead the first sortie, but just before take-off his chief of staff and old pal, Ira Eaker, came to him and said:

"Tooey, I want to go on our first mission."

Spaatz well knew that both the commanding general and the chief of staff could not go. He stared at Eaker for a long moment, then snorted:

"Well, I'm not going to rank you out of it."

So Eaker, on August 17, 1942, led a flight of 18 *Flying Fortresses* in the first all-American smash at Hitler's Europe while Tooey, chain smoking and gulping coffee—it is nothing for him to consume 15 cups of coffee when he is sweating something out—sat and waited.

That was the first of many such waits. Every one of them added gray hairs to Tooey's sandy mop. He loved the slim kids to whom he taught the know-how of air war and for whom he planned the missions against the Axis. He knew that some who left would not return. That was war and that was why Tooey drove himself day and night to get on with it and to end it.

Spaatz went to Africa with General Eisenhower, commanded all Allied air units there and in 1944 returned to England as commander of the United States Strategic Air Forces in Europe.

He held that post during the months in which the invasion coast was hammered and inner Germany blasted, during the invasion itself and until final victory over the Nazis.

Tooey burned with a fierce belief that, if given the chance, air power could win the war in Europe without the need for a surface invasion and all its attendant carnage.

His belief in the potential of air power still was blazing when, in June, 1945, he became commanding general of the United States Strategic Air Forces in the Pacific with headquarters at Guam. In that job he supervised the final strategic bombing of Japan, including the atom-bombing of Hiroshima and Nagasaki which culminated the war.

Tooey—the man who never wanted to be a general—is the only general (for that matter, the only individual) who was present at all three signings of unconditional surrender by the enemy—at Rheims, at Berlin and in Tokyo Bay.

Last December he was awarded the Robert J. Collier trophy, which goes annually to the American who makes the greatest contribution to aviation, but, honors, like brass, rest lightly on Tooey's shoulders. At heart he is still an aerial acrobat. Often, when fed to the saturation point with desk work, he will jump into an airplane alone and fly hell-for-leather across the country and back. It eases the strain that comes from being deskbound.

Unlike the exuberant Hap Arnold, Tooey is quiet, shy and, on duty, so businesslike that some of his subordinates sometimes suspect him of giving them a brush-off. His shyness often is taken for gruffness and in some quarters he is regarded as a bit of an ogre. At that, he is a rigid disciplinarian, a military man who believes that spit-and-polish customs serve a good purpose.

It is a fact, however, that Tooey is a friendly cuss off duty. His favorite relaxation is poker. After some 30 years of poker playing he still is far from a wizard at the art, but he is indefatigable and his sessions with cronies from the old days are legendary.

He also is a chess player. Perhaps his most memorable match was against a visiting Russian general. The Russian knew no English, Tooey spoke no Russian; yet they sat over the board for hours. Tooey lost. That may account for his high opinion of Russian strategy.

The general is a family man who has been acutely homesick for his wife and daughters every time he has been separated from them.

One of his foremost accomplishments is his ability to play the guitar. Since his West Point days he has been almost a virtuoso on the "gee-tar" and a battered instrument has accompanied him all over

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the world. His nostalgic twanging has been heard in England, at Souk-el-Spaatz, his African headquarters, on Guam and in Tokyo.

Spaatz is 5 ft. 8½ in. tall but he looks taller for he never has lost that West Point look. Despite a fondness for oysters and thick steaks he keeps his weight around 150 pounds. There is a level look in his gray-blue eyes, a look that matches the quiet confidence of his voice.

He is a believer in direct action and shuns Army protocol and red tape. He says exactly what he means and he makes decisions quickly, out of cockpit-born habit.

Tooey, in his earlier days, was a sky writer with few peers. His flying comrades used to say he could spread his name in smoke over 40 miles of sky. It is fairly safe to say that the name of Tooey Spaatz has been written over a lot more sky than that—and not just in smoke. END

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I Learned About Flying from That!

(*Continued from page 75*)

next. We were just clipping the tops of the smaller cacti at a speed of something over 90 m.p.h. when the big saguaro reached out and grabbed our rope. We stopped right there. The glider swirled and tumbled like a fish trying to rid itself of a hook, then, with devastating force, threw itself sidewise into the ground in an explosion of dust.

When I regained consciousness the dust was still flying. I extricated myself from the maze of broken tubes and ripped fabric and, through a haze of semi-consciousness, I heard a groan from what once was the front cockpit. I was almost afraid to look, fearful of seeing what I knew I must. The student sat, bent grotesquely in the jumbled framework, covered with dirt and with his head bent sharply over upon his left shoulder. I asked him to move his feet, assuming that if he could move his feet his back was not broken. He could move his feet.

How I managed to get 220 pounds of man, winter flying suit and parachute out of that wreckage I'll never know, for I'm just a squirt and I wasn't feeling very healthy at the moment.

I managed to lay him out alongside the glider and pillow his head on his parachute. I then splashed mercurochrome from the glider's first aid kit over the miscellaneous cuts and bruises we both had.

Then I sat down and waited but after a few minutes I suddenly recalled that there was another glider. I got to my feet and dazedly trotted out into the brush in a direction I calculated the other glider would have landed. I was very, very relieved to see that the other lad was unhurt. Through some miracle, his end of the rope had snapped out of his release just as ours caught the cactus. He made a fairly decent landing, damaging only the landing gear.

We both went back to where the injured student was, and started stripping the green foliage off the surrounding mesquite bushes which we piled in a stack and set afire. We had trouble keeping the blaze going but while it burned it produced a very dense, white smoke which rose high in the air to attract searchers. The towpilot had gotten lost on his way back to the field and was of no help in directing a rescue party. By the time we had finished our smoke-making we had burned off a good acre of desert landscape.

Three hours later we thought help was on the way, for a *Texan* saw our signal, buzzed down for a look and buzzed off again, still on course. For the ensuing three hours every airplane within a radius of 100 miles dropped down to investigate our plight but no help came.

Finally I grabbed a handful of charcoal embers from the smoking pile of mesquite, climbed up on the wreckage and scribbled "injury" on the one good wing of the glider to inform the sightseers that we had a wounded man down here in need of immediate medical attention. I had to beat out several fires starting in the doped fabric with my bare hands before I finally got the word finished.

Almost immediately we got results. A *Vigiliant* with the field's flight surgeon aboard circled a few times and finally plopped into the brush about a half mile away. A few minutes later the surgeon and his pilot came running through the mesquite carrying their medical paraphernalia. Thus, some seven hours after we hit the desert, help came.

An hour later the ambulance and a whole squadron of jeeps, "recon" cars and trucks came jouncing across the sea of gullies, rocks and ravines to the site of the accident.

The ambulance crew placed the injured student aboard and drove slowly but roughly off. I learned later that he suffered two cracked and dislocated vertebrae. As for myself, I bummed a ride home in the CO's jeep and took the rest of the day off.

There are many morals to this story and all glider pilots and towpilots would do well to absorb and remember all of them.

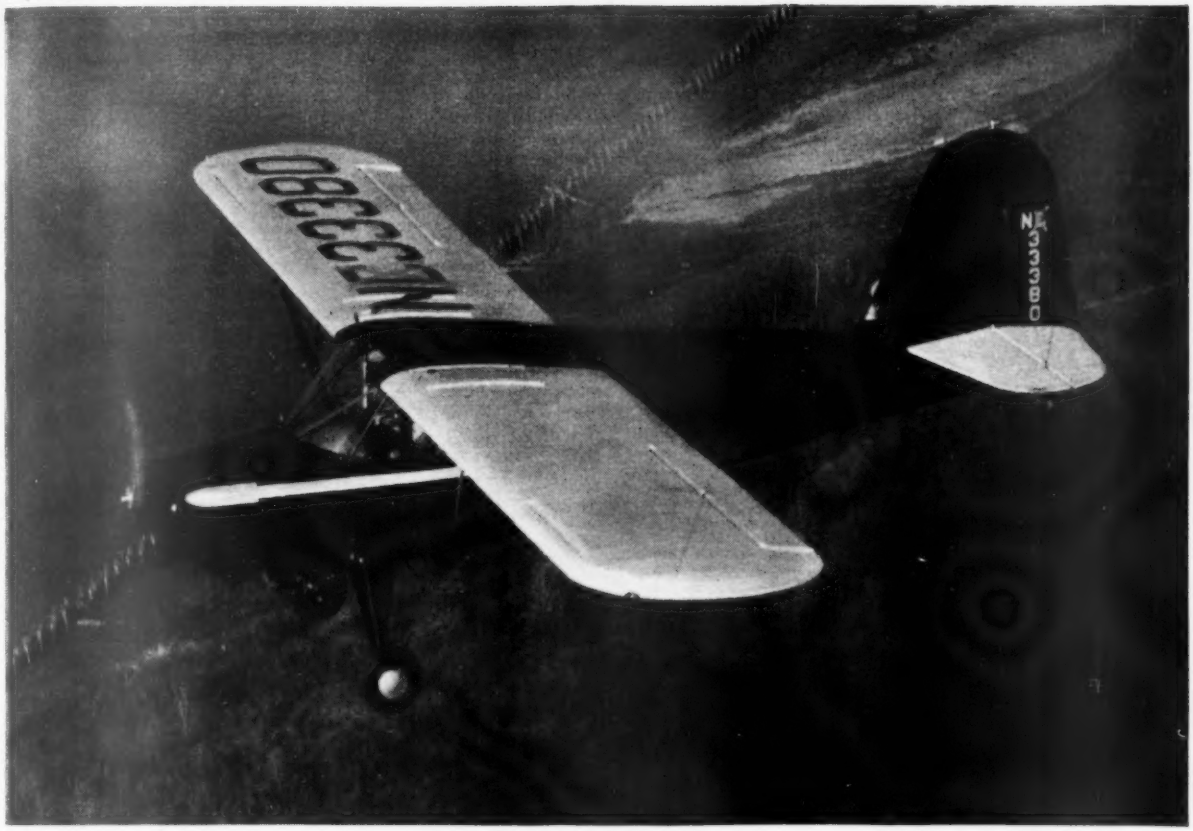
1. About those lights—only a fool would fly during periods of reduced visibility without lights, and a fool rode in one of those gliders that morning.

2. No towpilot should ever undertake towing in the dark until he has made many, many tows in the light of day and he should be familiar enough with his airplane that he can conveniently and constantly watch the gliders behind him.

3. Signals, glider to tow and vice-versa, should be discussed thoroughly and agreed upon prior to flight. This was the main cause of our accident.

4. The towpilot should never drop his end of the towline unless there is positive danger of the gliders ramming him. He provides the gliders' sole means of power and control.

5. Tow releases must be designed to operate positively, loaded or unloaded. If our releases had worked, we would have gotten off without injury. END



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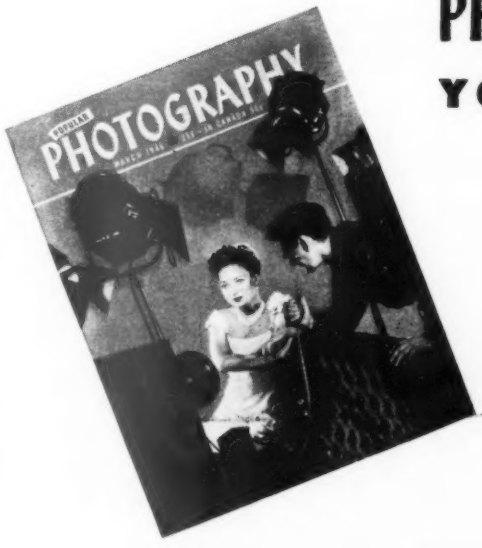

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Nebraska's Airport Boom

(*Continued from page 57*)

munities where the airport is on leased land, the commission is willing to provide only boundary markers and windsocks. The purpose of this is to give some aid to local aviation enthusiasts who haven't been able to interest enough voters to back their airport plans.

Agriculture sometimes scores a financial "assist," for land is often put into a cash crop with runways running through it.

Typical of the development of a Nebraska airport are the building of the sites at Wayne (population 3,000) and Blair (population 3,500).

Wayne is a state teachers' college town in the middle of a rich cattle feeding country about 120 miles north of Omaha. Theoretically the community has had an airport for 12 years, as 53 acres were leased for that purpose in 1934. However, the airport development hit a snag in the '30's and for six years the land was used mainly to grow corn.

With the opening of the Civilian Pilot Training Program in 1940 the college decided it wanted an aviation program. Wayne's Chamber of Commerce tackled the program with the co-operation of the City Council and as a result, the city invested $3,500 in a 50-foot-square hangar. In 1943, with the CPT being replaced by the WTS, more expansion was needed and the city invested $1,500 in a 50-foot extension to its hangar. A second building was also purchased for $1,200 that year for use as a combination repair and machine shop.

A country club was moving to another site and the city fathers stepped in. Since the clubhouse was adjacent to the airport and the club was now moving to city-owned property, the city made a deal that transferred the clubhouse to the airport. Mayor Herman Lundberg says the clubhouse was "swiped," for it only cost $120 to move it to the airport proper.

In 1943, R. G. Fuelberth, operator of the Wayne Air Service, invested in a two-plane hangar to complete the buildings layout.

Until 1944 the airport land was leased but citizens, realizing that it was a losing proposition to pay rent, decided to purchase it. Eight thousand dollars was taken from the general city fund and a $17,000 bond issue made up the balance of the $25,000 purchase price for 105 acres of airport property.

The field has four blue grass sod runways 100 feet wide. The N-S strip is 2,350 feet; NE-SW, 3,300 feet; NW-SE, 2,100 feet; and E-W, 2,400 feet. Except for the actual runways, the land is in alfalfa. Land not actually used for the airport brings in an annual rental of $550 and Fuelberth, who now operates the entire airport, pays an annual rental of $480. Until 1945 the community paid all costs of airport improvements.

In early 1945, the mayor and Fuelberth went to the state commission for financial aid in grading and seeding runways. They got $8,000 for the job and later collected $300 for the construction of a 1/10-mile dike along a creek that borders the field.

Cattle feeders and pheasant hunters are the present main source of income for the Wayne airport's operator. The cattlemen fly to other states to make purchases and the hunters make the airport a stopping place on their trips.

At Blair, 22 miles north of Omaha, the airport is already making a profit for the town. The land was purchased with a $15,340 bond issue which is paid with a one-mill annual tax levy producing $1,400.

Paul Kittrell, State Aeronautics Director, (right) and Nebraska Aeronautics Commissioner Max Kier (left) talk with R. G. Fuelberth, Wayne Airport operator.

Another levy of ½ mill provides $700 for maintenance of the field. In addition, the state commission has given a total of $8,200 for various improvements.

One hangar rents for $600, lease of the field a hangar-office building to the Blair Flying Service nets another $600 and the alfalfa crop brings in $1,200. Most of the maintenance work is donated and expenses run only to about $300 annually.

In summing up the financial aspects of the Blair aviation venture, the credit side lists $3,100 a year—including the half-mill upkeep levy—and the debit is the $2,100 paid by the Blair taxpayers and the $300 upkeep costs. That leaves $700 in profit which is transferred into the city's general fund.

With the exception of the mayor, airmen report, the city has been rather cool toward their airport venture and it has only been with the help of the Aeronautics Commission that they were able to make ends meet. Six times in five years they were forced to go to the commission for financial help.

A four-stage plan has been worked out for Blair by the CAA and is being followed carefully. At present, development is in the second stage. The third stage will require the purchase of 1,000 feet of land to the south. This will permit lengthening present runways to 3,400 feet and provide space for an east-west landing strip 1,800 feet long and 500 feet wide. When and if the airport reaches the fourth stage, the two main runways will be paved, and the east-west strip will be lengthened to 2,100 feet.

Until recently there were 11 airplanes at the field. Now, because some of the flyers decided to sell their old planes and wait for new ones, there are only seven. However, Airport Operator Byron Appleby, owner of Blair Flying Service, predicts that one year from now there will be 20 planes at the field. He is waiting for city approval to begin construction of a new 50x60-foot hangar and office building.

The facts cited above may sound as though it has been easy sledding. The Blair people don't think so. They look back upon the past five years as a series of crises. The stalwarts to whom most of the credit must be given are Dr. C. D. Howard, physician, Ben Reeh, grain dealer, and Emory Hunt, Jr., telephone company official.

The project began in September, 1940, when it was discovered that Dana Lutheran College could obtain a CPT course if an airport could be established within the next 72 hours. The city council was stampeded into leasing 120 acres of alfalfa land on the Missouri River bottom. Rental price was $7 per acre.

On the field were 10 hay stacks, but there were no funds to pay for their removal. So one day 25 volunteer workers with 10 donated trucks moved the stacks. Many of the same workers have been donating their efforts ever since.

In response to an urgent appeal, the State Aeronautics Commission granted $900 for a small hangar and office building. However, the field proved to be very unsatisfactory because of the mud and only one unit of 10 students was trained there.

In March, 1941, operations and building were moved to the present airport site. At first the 120 acres were leased at $825 a year, with option to buy.

The first crises developed when the Federal Government put into effect the wartime security measures for airports. To provide guards 24 hours a day and clearance officers during all daylight hours seemed almost out of the question. Things looked black, but the faithful few refused to toss in the sponge. They persuaded an elderly man to move to the airport and act as guard. They moved a trailer to the field for him and argued the city council into paying him $60 a month. He proved to be a stickler on the enforcement of regulations.

To meet the clearance officer problem, members of the group were assigned to be on duty during certain hours of the day. Fortunately the group included two farmers who lived adjacent to the airport. When these farmers noticed a strange plane entering the airport traffic pattern, they would drop whatever they were doing, hop into their cars and speed to the airport. Generally they managed to be serenely waiting, pencil and book in hand, when the strange airplane reached the hangar.

Instructors were a great problem.

"We'd no sooner find one," said Mr. Reeh, "than the Army would take him. "During one period the situation was so bad that each Sunday morning one of us would fly to Columbus, Neb., 80 miles away, and bring back a 54-year-old flyer. His time for the day would be equally apportioned among all who wished to take lessons. We'd take him home just in time

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The blackest hour for the Blair airport came in 1944. The option was about to expire and the owner wanted his land back because it had increased in value. Worst of all, no other good sites were available in the area. It was a case of buying the land before the option expired or losing the airport altogether.

The option price was $15,340. The only hope was to get a bond issue on the November ballot and prospects for its passage were poor. The enthusiasts staged the best campaign they could possibly devise.

"We feel that just one maneuver saved us," said Mr. Reeh. "It happened that there was a big boat launching ceremony at the Blair Boat Yards that day and a radio station had sent a mobile unit to broadcast the ceremony.

"Someone suggested that most of the people in Blair would be listening to the radio program and we got the bright idea that a strong speech about the airport bond issue might save the day. We quietly passed the hat and collected $25 with which to buy time on the air. The radio people were good sports and donated as much time as we paid for. Ralph Vinton wrote the speech. The radio announcer read it and we squeaked through with a margin of 46 votes."

The Blair flyers have proven that the small plane can do an amazing number of errands and chores.

When roads were impassable because of snow and mud, Dr. Howard dropped sulfa pills for a farm girl who was critically ill . . . Ben Reeh says he has purchased a good many fields of grain on the strength of what he was able to see from a plane.

Ralph Menke, real estate man, averages two or three trips a week with prospective farm purchasers. Usually he flies out to look at a farm from the air before he lists it. He says that he can learn more about soil erosion and "lay of the land" by flying above it for a few minutes than he could in a whole day of tramping over it on foot.

When the Missouri River is rampaging, Menke generally flies about three patrol trips daily in the Blair area. When farmers in the lowlands are marooned by snow or water he drops their mail to them from the air.

Emory Hunt, Jr., uses a plane to visit many of the 40 Nebraska telephone exchanges owned by his company.

Farmers frequently ask Byron Appleby, the airport operator, to fly in search of missing cattle, and once he was asked to make an aerial search for a child lost in a cornfield. Appleby regularly flies one cattle feeder to Alliance, 400 miles to the west, where the farmer purchases feeder cattle. The round trip is made in one day. Once a month he takes the superintendent of the Washington-Burt County Drainage District on a tour of 50 miles of drainage ditches. The tour takes 45 minutes. To make a comparable inspection by automobile and on foot would require almost a week.

"It's the farmers around here who are going to realize the greatest benefits from the small plane," said Appleby. "No one as yet quite realizes what the lightplane is going to mean to them." END

Captain Slate's Wonderful Airship

(Continued from page 62)

added an elevator, equipped with 1,000 feet of cable. He proposed to embark and discharge passengers on rooftops, open fields, or any other desired spot without the necessity of landing and mooring his craft.

This, too, was tested successfully in a semi-rigid conventional dirigible before being incorporated in the new ship.

The pilot was to head into the wind with just enough power to hold the ship stationary. The ship's fuel tank of heavy, reinforced steel would be lowered to the ground by cable. With this as an anchor, the elevator would be started down on another cable. Attached to the elevator was a trolley which encircled the cable attached to the fuel tank anchor, thus guiding the car and eliminating oscillation of the passenger cage.

A secondary use for the elevator would be for rescue work. The fuel tank anchor could be dropped onto rocks, any sort of terrain, or even the sea floor, with rescuers descending in the car.

Power for the hydraulic elevator hoist was furnished by another Slate innovation, a small controllable-pitch propeller which operated a small aircraft engine mounted on the outside of the ship. This propeller had been devised by Captain Slate even before the first World War and was used on external generators of military aircraft in that conflict.

For 2½ years, construction of the dirigible progressed slowly and carefully with innumerable tests. Two huge hangars, placed end to end, were constructed. All sorts of auxiliary facilities were installed.

Rarely had a project attracted so much local attention. Metal was almost a heretical thought in those days when the principal object of airplane designers was to make their craft as light as possible. Not a day passed without crowds of neighboring folk flocking to the field to gaze at the growing monster; to speculate about it and, in some instances, to scoff.

At last, in the waning days of 1928, the end of the long road came in sight. The last sheet of duralumin was fastened into place—and it fitted with less than ⅛-inch error from nose to tail. A celebration, including a luncheon inside the big passenger cabin, was staged.

Then, what potentially could have been a signal triumph turned into despairing tragedy. It was announced that a public trial flight of the dirigible would be made the morning of January 5, 1929, though all the final installations had not been completed.

Shortly after dawn, crowds began to arrive at the field. Reporters, photographers and newsreel men thronged the spot. Mechanics scurried around in the hangar, making last-minute preparations. Finally all was ready and the big ship

started to back slowly from the huge, round-topped building.

Then it happened.

There was a stacatto bang, bang, bang, as if a squad of riflemen had opened fire . . . rivets flew . . . Attendants hurried to get the ship back into the hangar—the top of its hull had split open.

What had happened? That old bugaboo of aviation since its earliest days—human error.

There were three automatic valves in the ship to release hydrogen when the pressure reached a certain point which could also be set for manual operation. During work in the hangar, the valves had been for manual operation and, through oversight, they were not changed back to automatic functioning.

When the ship emerged into the warm California sunshine, the hydrogen quickly expanded. There was no one in the control cabin to note the pressure recorded by the dials. Something had to give and so the big ship simply opened up. Blowers were installed at once to remove the hydrogen, but it was 12 hours before the last sandbags no longer were needed to hold the dirigible down to the ground.

Subsequent survey of the ship disclosed that it would be cheaper to build a new one than to attempt to repair the damaged one. Also, this would give opportunity for some minor alterations that had seemed desirable following the preliminary tests.

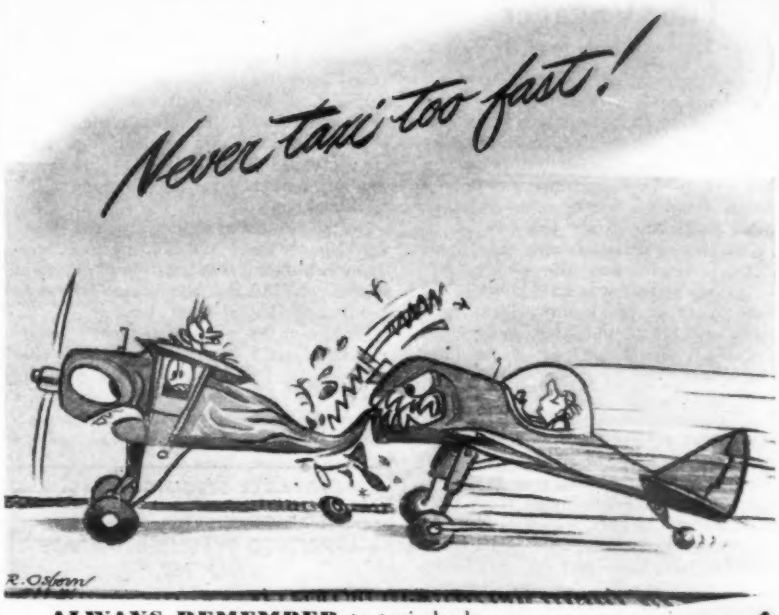
It was decided to stage a destructive test to determine just how much stress this type of construction could stand. With the ship suspended only by nose and tail and with no hydrogen in the envelope, attendants started early one morning to pile sandbags in the cabin. All day long they shuttled back and forth lugging sand. Nothing happened. Toward evening so much sand was aboard that the cabin sagged to the ground but still the ship refused to buckle—an amazing indication of its structural stability.

Finally the top was intentionally caved in and still the craft stood the strain—all the evidence that anyone could ask that the eggshell type construction was as sturdy as Slate had claimed. The craft then was dismantled and parts were stored for a second building venture.

Plans immediately were made to build the second ship, but the effect of the stock market crash of 1929 hit. Financing obviously became impossible and the project had to be abandoned, thus saving the glory of propellerless aircraft and elevator-equipped flying machines for a later generation.

Captain Slate, still active as an engineer, has been moving about California on various projects during recent years. He founded the Dry Ice Corporation of America prior to the time he began building his dirigible.

What might have happened, had not fate stacked the cards in two-fold fashion against the enterprise, is an interesting speculation and anyone's guess is good. One thing is certain, however—that propellerless aircraft and aerial elevators are much older than most of the present generation suspect. END



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The Voyager

(*Continued from page 34*)

no two perform alike, even though they go down the same production line.

FLYING's test flight was made in the *Voyager* demonstrator of National Airmotive, Inc., Stinson distributors in the Chicago area. I was accompanied on the flight by Irvin L. Smith, sales manager for the distributor; only the two of us were in the airplane during the flight. Our total weight was 375 pounds; the plane's gross weight was 1,848 pounds, 302 pounds short of maximum. With four persons and 129 pounds of baggage, the *Voyager* carries 20 gallons of gasoline, giving it a maximum range of 278 miles at cruising.

The *Voyager* carried 42 gallons of fuel (252 pounds) at take-off. Temperature of the outside air was 37° F., dew point 27, and the barometer reading was 29.95.

The first take-off was made from Chicago Municipal airport, which is 610 feet above sea level. Normal take-off flap was used (the flaps have just two positions, landing and take-off). Greatest surprise of the flight came on the take-off. Giving it full throttle and pushing the wheel forward at the same time, I was astonished to find the airplane in the air and climbing steeply almost instantly. It is doubtful that we rolled 100 feet. The strong wind was largely responsible for this, but the airplane's subsequent performance bore out the fact that it has excellent take-off and climb characteristics. Once in the air, I held the *Voyager* in a steep climb. Indicated air speed was 80 m.p.h. and the engine was turning 2,550 r.p.m. We crossed the street bordering the airport on the south (about 5,200 feet from take-off) our altitude was 950 feet above the ground.

In the air, we climbed to 2,000 feet where I started to test the *Voyager's* maneuverability. I trimmed it for level flight with the horizontal stabilizer handle, which is directly overhead between the pilots' seats. Once trimmed, the plane had above-average stability.

Although there is no adjustable vertical stabilizer, the airplane maintained a satisfactory heading despite the rough air.

The *Voyager* has excellent stall characteristics. With full flaps and power at idling, I pulled the airplane steeply into a stall several times. Each stall was preceded by plenty of advance vibration warning, then the nose dropped below the horizon for the few seconds necessary to pick up minimum flying speed. It was not necessary to use either rudder or aileron to hold the plane on its heading.

The stall in the *Voyager*, however, is not the old-fashioned stall in which the airplane breaks sharply, falls off on a wing and, unless corrected instantly, into a spin. The new Stinson's elevator has limited travel, so it cannot be pulled into an uncontrollable stall. The airplane I flew stalled out at an indicated 50-52 m.p.h. But even when held tight in the stalling position, so that the airplane was flying through a series of stepped-down stalls, there always was plenty of aileron and rudder control. In other words, one should have no fear of maneuvering the *Voyager* at minimum speeds at low altitude—as in a forced landing, for instance.

While I made no determined effort to force the *Voyager* into a spin, I did just about everything that would have resulted in an inadvertent spin in an older design of aircraft. Yet, due to the limited elevator control and leading-edge slots (to increase aileron control), there never was any tendency for the *Voyager* to fall off out of control.

On the subject of flying "low and slow," the *Voyager* gives excellent performance. Using full flap, it was possible to maintain altitude at 3,300 feet above sea level at 80 m.p.h. indicated, at 1,800 r.p.m.

Probably the one performance characteristic most discussed among private pilots is an airplane's honest cruising speed. While some aircraft manufacturers do "gild the lily" in their advertising, most reputable companies make a determined effort to tell the truth. Some have been guaranteeing their performance figures within two per cent. Stinson officially claims its *Voyager* will cruise at 125 m.p.h. (ground speed) at 2,550 r.p.m. I wanted to check that figure.

VOYAGER SPECIFICATIONS

Source: Stinson Division, Consolidated Vultee Aircraft Corporation, Wayne, Mich.

APPROVED TYPE CERTIFICATE NO. 767

ENGINE: 6-cylinder Franklin, 150 h.p.
WING SPAN: 34 feet.
LENGTH: 23 ft. 6½ in.
HEIGHT: 6 ft. 10 in.
EMPTY WEIGHT: 1,206 pounds.
GROSS WEIGHT: 2,150 pounds.
TOP SPEED: 133 m.p.h.
CRUISING SPEED: 125 m.p.h.
MAXIMUM RANGE: 500 miles.
RATE OF CLIMB: 770 f.p.m.
SERVICE CEILING: 14,000 feet.
TAKE-OFF (sea level): 550 feet.

Because of the high wind Mr. Smith and I selected a course directly paralleling the wind. The course was between Harlem and Prosperi airports, both just south of Chicago Municipal airport. The distance between the two is 12.25 miles. Flying at 2,610 feet above sea level at 2,550 r.p.m., we flew the upwind leg of this course in 8 min. 20 sec., for a ground speed of 88 m.p.h. The downwind leg was flown in 4 min. 47 sec., for a ground speed of 154 m.p.h. Average ground speed for the two legs thus is 121 m.p.h. While that is four m.p.h. slower than Stinson specifies, I am sure that the extremely rough air experienced throughout the flight, plus my lack of experience as a *Voyager* pilot, more than accounts for the difference. It was practically impossible to hold a constant altitude, for instance; I was only able to hold fairly closely between 2,510 and 2,610 feet above sea level throughout the round trip.

Two checks were made on the *Voyager's* rate of climb. The first climb was from 2,610 to 3,610 feet above sea level. Using maximum throttle (about 2,550 r.p.m. in the climb) and holding 80 m.p.h. indicated air speed, we made the 1,000-foot climb in 1 min. 13 sec. The second climb was from 3,610 to 4,610 feet above sea level, in exactly the same time. This worked out to a rate of climb of 820 f.p.m. Stinson claims 770 f.p.m. when the airplane is carrying its maximum load of four persons, baggage, fuel and oil.

The *Voyager's* performance in landing also is excellent. The approach is made in normal lightplane fashion up to the point where full flap is dropped. The airplane's glide path then is steepened considerably. The normal power-off lightplane landing technique probably could be used right down to the runway if the approach was made from higher altitude. However, my downwind leg was at 800 feet above Ashburn Field (another airport near Chicago), so it was necessary to fly the *Voyager* through the rest of the approach with power. Once again the wind made the *Voyager* look spectacular; I hit the hydraulic brakes as the wheels touched and we stopped within a few feet.

The *Voyager's* ground handling characteristics are good for the tail-down type of landing gear. I would tend to be more critical at this point, for I have been doing a good deal of flying in airplanes with tricycle landing gear, having a steerable nose wheel. The positive, easy-to-handle, excellent-visibility characteristics of the tricycle gear make it unfair to compare it with the conventional wheels-and-tail-wheel combination.

However, the *Voyager* is one of the best tail-down airplanes we have handled on the ground. It has better-than-average visibility forward, the tail wheel is steerable through the rudder pedals, and the toe brakes give adequate control. Yet, it was necessary for me (5 ft. 11 in. tall) to stretch my neck to see over the nose during taxiing. At no time did it show ground-looping tendencies.

The *Voyager* is the quietest lightplane I have flown, but still is a good deal noisier than an automobile. But it is so quiet in the air that the two-way radio (standard equipment) has only a loudspeaker directly over the pilots' heads; no earphones are carried.

Normal fuel consumption is nine gallons per hour. We burned 14 gallons during our test flight, for an average of 9.2 gallons per hour; the slightly higher consumption was the result of about seven minutes of flying at wide-open throttle.

Visibility in the air is excellent in all directions except to the rear. Forward visibility is unusually good, the *Voyager* flying in a seemingly nose-down position. My tendency—as is true of all pilots new to the *Voyager*, I am told—was to hold the nose up, another reason I had difficulty in holding a constant altitude.

Access to the cabin was a little difficult for me. I had to pull myself in by hanging onto a tube that slants across the windshield (and doesn't help visibility any). In flight, the cabin was somewhat drafty and the heater was not working well; both shortcomings probably were due to the fact that the airplane, a demonstrator, had been handled roughly.

The instrument panel is attractive and conventional. The knobs are easy to find and operate. The flap handle is near the floor, between the pilots' seats. An hour-recording tachometer, landing lights, pants, radio, starter, generator and battery are standard equipment. The propeller is wood and fixed-pitch; a controllable propeller probably would give the

Voyager a bit more performance—but would cost as much as $350 extra.

The engine is easily accessible, the hood opening upward on each side.

The take-off from Ashburn Field was not as startling as my first take-off from Chicago Municipal Airport. But the airplane was ready to fly some time before I realized it. Using take-off flap, we were off the ground in eight seconds; we probably could have been off in about five.

Once again, the steep climb. Mr. Smith demonstrated another safety feature of the *Voyager* by pulling up the flap during the climb. The nose dropped slightly, but the climb continued and under complete control. Pilots who fear having to pull up flaps near the ground need not fear the *Voyager*.

We returned to Chicago Municipal Airport for our final landing. The wind now was 23 m.p.h and gusty. The approach was normal, with both Mr. Smith and me on the controls. The plane went in, hit lightly, bounced slightly, hit again, bounced again—in all there were six shallow porpoising arcs. The *Voyager* rolled to a stop in the middle of the huge airport. It was then that we discovered that each had thought the other was flying the airplane. We each had been "following through" lightly on the controls; the airplane had landed itself!—MAX KARANT

Television for Private Flying?

(*Continued from page 29*)

are a recognized necessity for avoiding a zig-zag course. In order not to require pilots to glance back and forth between the Teleran indicator and the compass, the heading is shown by parallel lines ruled on a transparent disk placed in front of the Teleran indicator and rotated by a servo to the compass.

It is essential for the pilot to know which of the transponder responses represents his plane. This is accomplished by a radial line passing through the pip corresponding to that particular plane. The radial line is obtained by controlling the television receiver with a voltage derived from the transponder so that a rotating but normally invisible line constituting part of the television signal appears as a bright line when the transponder is active. Since the transponder is active only when the radar is pointing at it, the radial line necessarily passes through the proper pip and each pilot sees a different radial line which indicates his own plane.

A number of methods may be used to get the combination radar-map picture for televising. A transparent sheet engraved with the proper lines and symbols can be placed in front of the radar tube. Edge-lighting causes the engraving to appear bright but does not shed light on the face of the radar tube, which would reduce the contrast of the radar indications.

Another method employs separate television cameras for the radar tube and for the map, and the outputs are added electrically to give the combined picture.

A third method utilizes the technique known as "video mapping," in which a special signal is generated and added to the radar signal so that a map appears directly on the radar tube together with the radar pips. This type of combined signal can be broadcast and reproduced in aircraft by relay radar methods.

Which of these will be used ultimately will be decided after further experimentation.

The basic system, regardless, will require a ground search radar, ground selection equipment to separate the transponder responses according to altitude levels, television cameras for picking up the radar presentations and maps, television transmitters for sending the pictures aloft, and a television receiver and transponder in the airplane. A complete system contemplates the use on the ground of high-powered radar sets for between-port coverage, low-powered sets for airport zone coverage, and high precision radars for instrument landing, together with suitable television transmitters.

Perhaps the most unusual feature of the system is its application to landings under extremely low ceiling conditions or when visibility is greatly restricted. For this purpose, an additional ground installation is provided whose function is to locate precisely all aircraft on the landing approach path and to transmit to these planes an accurate television picture of the position

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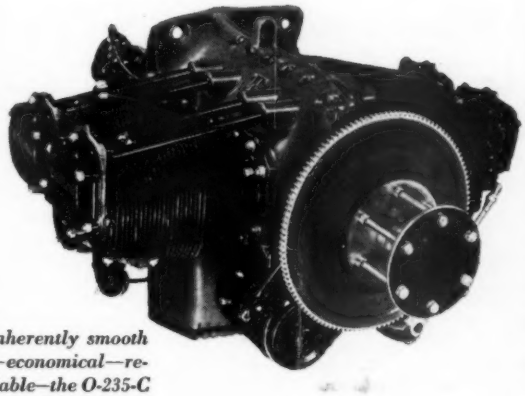

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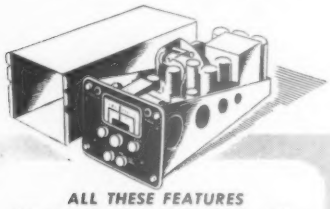

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of the aircraft with respect to the ideal approach path. This is done by representing each aircraft with a radar pip which shows distance and direction from the airport. A vertical line representing an extension of the runway shows whether the plane is to the right or left of the proper glide path, and mileage marks along the line indicate the distance to the airport. In addition, a horizontal line shows whether the plane is above or below the ideal glide path. If the plane is at the correct altitude, the line passes through the pip. If the plane keeps on the glide path, the horizontal line moves toward the airport with the pip. The line is produced automatically.

Another important feature of the system is the possibility of providing a traffic controller with information on traffic conditions beyond his particular control zone. This information may be relayed to the controller from remote search radar installations.

Summing up Mr. Jones' words, "the system appears to be capable of fulfilling all the requirements for a comprehensive system of air navigation, traffic control, collision prevention, and instrument approach. It furnishes the pilot and ground controller with accurate and timely information concerning the locations of all aircraft of interest. By its use the pilot may participate in the traffic problem and the handling of traffic may be accomplished at a greatly increased rate.

"And it also provides a maximum of safety against collision both with terrain obstacles and other aircraft," he concludes.

Federal and civilian experts recently got a close-up of Jones' plans at conferences called by Maj. Gen. Curtis E. LeMay, deputy chief of the air staff for research and development, at the Pentagon, Washington, to discuss air navigation and traffic control problems.

During the conference, AAF officials revealed that approximately one million dollars is being appropriated by the Army to continue Teleran development under RCA auspices. Expenditure of these funds is tempered by the following official statement on the Teleran system by AAF communications experts:

"From the pilot's standpoint the system offers certain definite advantages in giving the pilot a complete picture of what goes on around him without overloading his sense of hearing. The system, of course, does not adapt itself to automatic flight control, since the electric impulses used in presenting the visual picture cannot be translated into the auto-pilot mechanism; but the AAF believes that this deficiency could be eliminated eventually. One other objection not usually presented by RCA is that a radio communications set must be carried in the plane in addition to the television equipment, inasmuch as the television equipment provides no means of air-to-ground communication.

"The feeling resulting from the conference, as far as the AAF is concerned, is that research and development should continue with all systems and that the final solution may be reached by selecting certain features of all systems and combining into one. The AAF does not feel that any of the systems presented at the conference were in any way fantastic or ridiculous. Not any one system, in itself, offered a complete solution to all-weather flight and traffic control, however."

Typical of other comments coming out of the meeting was a statement by Donald M. Stuart, chief of the technical development division of Federal Airways, CAA:

"While Teleran is something too far into the future for thorough comment, and obviously a number of technical problems will have to be solved, the system is effective in principle and undoubtedly should go a long way toward ironing out current difficulties and hazards in air navigation."

Gravest question in Stuart's mind is the potential costs of installing the Teleran equipment if it does reach a mass-production stage.

"At least, from present standards," he says, "costs of ground equipment will be a tremendous barrier to overcome. Those who favor the system estimate that search radar ground installations will run to at least a half billion dollars, as contrasted with the estimated 20 million dollars it is costing to install VHF coast-to-coast. Another 125 million dollars is estimated as the annual cost of radar maintenance. It seems to me that it will take a very optimistic Congress indeed to approve such expenditures, even five years from now when aviation has grown considerably beyond what it is today."

Similar skepticism about the cost of cockpit equipment—estimated at a minimum of $500—was expressed by J. B. Hartranft, of the Aircraft Owners and Pilots Association.

"If price can be brought down to more reasonable levels when Teleran reaches the production stage, it would appear that it is one of the outstanding developments in the field from the private pilot's standpoint," he says. "At the very least, it is a major step in the direction of reducing navigation gadgets and dials to a minimum."

After the conferences, Navy was alone in announcing that it contemplated no use for Teleran.

The reply of Jones and other partisans of Teleran to the cost factors is that the system will pay off in safety and efficiency when there are enough planes in the air to make installation worthwhile, and that mass use of the television units involved—the only equipment the pilot will have to buy—should bring the prices down.

Mr. Jones also says that "radar to be used in connection with Teleran instrument landing will, it is estimated, cost no more than one-quarter as much as the complete GCA equipment developed by the Army during the war. Furthermore, unlike GCA, no large operating crew will be needed." The Teleran landing radar transmitters, receivers and antennae will be installed at the ends of airport runways and the data from all landing radars on a single airport will be relayed automatically, without need of personnel, to the control center.

Whether Teleran will become standard equipment in U. S. aircraft cockpits of the future is, as has been indicated, still speculative. Nevertheless, it has already opened new vistas for electronics experts and for all who fly. END

The President's Pilot

(*Continued from page* 31)

its take-off was delayed on the Washington-Kansas City trip because the pilot had it out on the line while it was still sleeting. When it came time for take-off he had to go back into the hangar and thaw the plane out. Meantime, I'd kept the *Cow* under cover until the sleet let up and was ready to go the minute it did.

"On the return trip, my pilot's rating enabled me to take off without getting the approval of the officer in charge of Army operations at the field. The other pilot's didn't. By the time he got his okay, the weather had changed for the worse, necessitating further delays. As a matter of fact, he was so late getting off that Washington was closed in when he got there and he had to go on and sit down at the New Castle Army Air Base, Wilmington, Del.

"Incidentally," Colonel Myers added with a grin, "the newspapermen's delays going and coming and the final landing, miles from home, might just possibly have influenced the way they handled the story."

As a matter of fact, the Christmas flight west was delayed by Colonel Myers from early Christmas Eve, when the President first asked for it, till mid-day Christmas when Colonel Myers, after advising with his crew and weather officials at Washington National Airport, decided it was okay to go. And he spent most of his time in Kansas City studying weather reports before the trip back.

"Except when I was answering the phone," he adds. "I got calls from everybody, top to bottom, when the newspaper stories about the 'hazardous, perilous' flight appeared."

Did the stories surprise you?

"Was I surprised?" Colonel Myers exclaimed. "I felt like General Eisenhower, when he got back from France after VE-Day and was asked if he had been worried during the Battle of the Bulge. 'You bet,' he replied; 'three weeks later when I got the American papers. And then it scared hell out of me.' Me, I wasn't worried about the flight from Washington to Kansas City—till I saw the papers!"

Checking on the weather isn't, of course, the only precaution taken for a Presidential flight. The plane's condition is always A-1—the result of constant checking by the crew. These, beside Colonel Myers, who is a native of Tifton, Ga., and a graduate of Culver Military Academy, University of Georgia, Army's Kelly Field and 10 years with American Airlines, are Co-pilot Maj. E. F. Smith of Clearwater, Calif., Crew-chiefs Master Sgt. F. J. Willard of Philadelphia and Master Sgt. F. A. Winslow of Brewer, Me., Navigator Maj. Ted J. Boselli of Greenville, S. C., Radioman Master Sgt. C. A. Horton of Gravette, Ark., and Flight Traffic Clerk Sgt. Lee Poliner of New York City, formerly a steward with Eastern Air Lines.

With the exception of Sergeant Poliner, this outfit has been together for more than 3½ years and, as Colonel Myers puts it, "we all know what the other guy is going to do before he does it."

Daily at 10 a.m. the entire crew, with the occasional exception of Colonel Myers, assembles at the plane and gives it a routine check-up. Colonel Myers is sometimes absent when in Washington, as he has other AAF duties as special assistant to General George, head of the ATC.

Other check-ups follow the usual Army routine except that the *Sacred Cow* has two crew chiefs who do their own work when not at the Washington National Airport base where they supervise closely the picked ground crew. Whenever possible, the 100-hour checks are made at the Douglas plant at Santa Monica by a hand-picked crew that has been combed and okayed by the FBI. It goes without saying that the *Cow's* crew, the WNA ground crew, the 24-hour guard kept on the plane when it is grounded—everybody who has anything to do with it or comes near it—is subject to close FBI scrutiny and approval.

But Colonel Myers continues to insist that, with the obvious high-policy precautions, these safety checks are no different from those given any Army or civilian transport.

"That's why I cannot understand all this hullabaloo about the President being in danger when flying," Colonel Myers said. "You can bet your bottom dollar that any flight we make is routine, devoid of unusual risk and one that I would not have started had there been any elements of danger attached to it. Can't people understand that when we take off from Washington, for instance, we have enough gas aboard to sit down in California if necessary? And after all, I think as much of my neck as the President does of his."

It might be stated with some fairness that, so far as flying is concerned, Colonel Myers might be said to think a little more than the chief executive about aerial risks. He learned about them the hard way. Married only recently, there was a time just after he completed his Army training that he was among the few bachelors flying for American Airlines. As a result, he flew all the routes and drew many of the tough assignments.

Outstanding lesson in his book was the time he was flying a Lockheed *Orion* west over the Appalachians, got into a tornado and kept working his controls only to find that no matter what he did, instead of heading west, the plane insisted on heading east.

"I told myself that once I got my feet back on solid ground, I'd keep 'em there," he adds.

However, he went on to become one of American's million-milers and was based at Ft. Worth in May, 1942, when called to arms as an AAF reserve lieutenant of 13 years' standing. He was told that he was to be an aide to General George and at first tried to duck the job, thinking it meant opening doors for the brass and attending Washington tea parties. But when it was explained that he would be a flying aide, he was more than happy with the assignment which he now considers the best in the Army.

He's never regretted it. First assigned to flying Congressional committeemen and others forwarding the war effort, he eventually became pilot of the late Presi-

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dent Roosevelt's flights. He was the only candidate to become master of the *Sacred Cow* when it was completed. Since then, he and his crew have flown the plane some 1,500 hours and 330,000 miles to so many countries that now they tell where they have been in terms of the nations they've missed—Argentina, Chile, Poland and Czechoslovakia. A recent trip was an off-the-record hike Colonel Myers made during the Potsdam conference.

He and his crew had special authorizations permitting them to enter the Russian zone in Berlin and pretty soon they found themselves in Hitler's wrecked chancellory. Nobody paid any attention to them and they finally came upon some unopened chests. Looking in, they found that some of them were filled almost to capacity with German medals. Hank and Co. grabbed some small clothes baskets that were near by, filled them with medals and walked unmolested back to the *Sacred Cow*. Medals made in Germany are nice presents to friends, especially if the friends are in the AAF.

After 13 years as a lieutenant, Myers became a captain two weeks after he went on active duty, a major in October, 1942, and a lieutenant colonel in August, 1944.

He has never had an instrument landing in all his flying of the gold braid. Before Mr. Truman became President, the *Sacred Cow* did much more special flying than now. However, President Truman likes to travel by air so much that he loans the plane to others less frequently than did President Roosevelt.

There have been few changes in the *Sacred Cow* since the Truman regime. The elevator installed for President Roosevelt still is in working order and is used occasionally—as when Mr. Truman's mother flew to Washington. The Roosevelt pictures of sailing ships still hang on the walls. Mr. Truman did ask for one thing and got it—an outside thermometer by one of the study windows.

Something new will, however, be added to the plane if letters which pour in have anything to do with it. The something will be an insignia. Everybody concerned is all for the idea but delays have been caused by a debate as to whether the *Cow* is too dignified to carry a comic design on her bosom and stationery. Walt Disney has designed one which appears on page 31; pictured with it is the favorite of the experts and of Colonel Myers. The latter design, like scores of others, came in the mails from volunteers.

Colonel Myers has enough points to release a regiment but plans to stay on with ATC as long as they need him. He says that the same thing goes for his crew. As for adding to the safety already surrounding presidential flights, he is looking forward to a bigger and better *Sacred Cow* —a DC-6.

But he thinks that the present model has pretty well proved that the flying machine is here to stay as a transport leader. Take that much-debated Christmas flight back from Kansas City, for instance. Somewhere over Ohio, Colonel Myers picked up a news item on the radio which he promptly phoned back to the President. Seems that Mr. Truman's Kansas City limousine on its way home from the airport had skidded on the ice and crashed into an oil truck. After being assured that no one was injured, the President laughed. END

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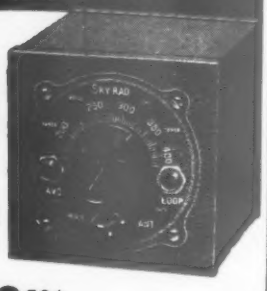

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Timber Take-Off

(*Continued from page 68*)

Down there was a small plowed field. He knew it was muddy but gas was low and there was no alternative.

An ordinary landing in the soft, muddy field would almost certainly result in a nose-over with serious damage to the plane and possible injury to himself. But Weber wasn't contemplating an ordinary landing. Coming in close to the break in the tree line, he dropped the *Cub* toward the ground and opened the throttle as the wheels began to take up the plane's weight. The added thrust of engine held the tail down as the plane plowed to a stop.

Weber closed the throttle, cut the switch and crawled out to look around. He certainly hadn't landed on an airport. He was on a sloping hillside of a farm owned by Bob and Henry Christensen.

High up on the hill there was a possible take-off spot. An airplane could possibly get into the air from there but the take-off would probably be more like a roller-coaster ride.

A week passed before the weather began to let up sufficiently for the attempt. In the meantime, Weber made preparations. With the help of C. L. Hall, the Christensen's hired hand, and Bill Markely of Eugene, Weber taxied the plane across the plowed, soft ground and up the hill to the edge of the clearing. To get the *Cub* up there a wire fence had to be torn down. The plane was turned at the top of the hill and the tail tied to a tree.

Weber examined the clearing closely. It had been carved out of a hillside stand of mountain timber—and the hill was really steep. Weber saw at once that he could never clear the trees at the top of the hill if he took off up the 35° slope—in fact, he probably couldn't even get off the ground. Trees that blocked the down hill edge of the clearing were not so tall.

If he had a little wind, Weber figured, he could take off downhill into the wind and clear the trees. Weber waited several days but the wind refused to co-operate. What wind there was seemed to be blocked off by the tall timber. Finally, with the help of Hall, Mechanic William Ray of Bend, and A. G. Hendrickson of Eugene, Weber was ready to take off anyway. He would have to fly between two trees not much wider apart than the *Cub's* wing span, but he determined to chance it. In addition, there was only 100 yards of solid ground for take-off. The rest was the plowed, muddy field he had landed in.

The tail was left roped to the tree as Weber crawled into the front cockpit. Hendrickson spun the propeller and the engine was warmed up.

He checked the magnetos and throttled back—Hendrickson went back to the tail with an ax; Hall and Ray braced themselves against the wing struts and kicked away the chocks.

Weber shoved the throttle and the Continental engine roared wide open. That engine had to be at maximum r.p.m. when the plane started moving or Weber knew he would lose precious space. Weber gave the signal and Ray and Hall flung themselves to the ground. At the instant they dropped, Hendrickson swung his ax and cut the rope holding the tail.

The *Cub* shot away, bumping down the hill. Those trees at the end of the emergency runway came closer and closer and the space Weber had to fly through seemed to become narrower.

Twenty-five yards from the plowed mud, the wheels cleared. It was a good thing that the fence had been torn down or the gear never would have cleared it.

Airborne, the little plane streaked between the trees; there wasn't more than a foot to spare at either wing tip. END

Bermuda Barter

(*Continued from page 22*)

tribution of airplanes to other countries during the war, the American aircraft industry was prepared with transport planes the U. S. airlines could start flying around the world immediately after the war ended. The British, for reasons of prestige, did not want to buy American aircraft. They preferred to delay the whole business until their plane makers had a brief breather that might enable them to catch up in the race.

Each side had its hole cards. Great Britain's far-flung empire had possessions lying across the international air routes at numerous strategic points that are important either commercially or as refueling stops. London itself was the goal of the majority of American travelers. In addition, the British wield a strong influence on aviation interests in many countries in Europe and Asia.

His Majesty's government, however, was seeking a loan of some four billion dollars from the United States, a loan vital to the whole economy of the empire. With American opinion sharply divided on the loan question, the British could ill afford to encourage opposition in Congress by stalling U. S. air transport ambitions indefinitely.

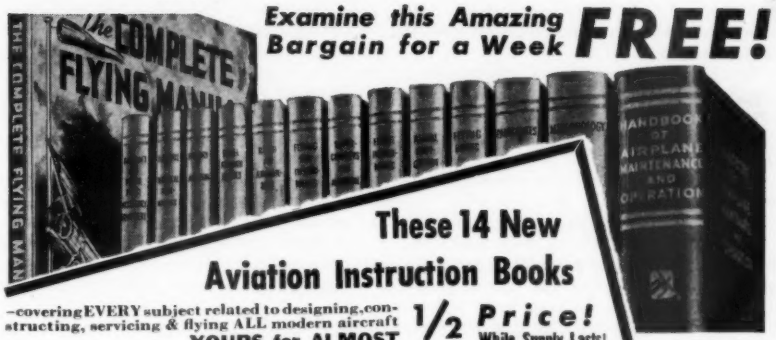
Moreover, Great Britain was gradually losing the support of certain countries that originally had sided with her in favor of some sort of rigid international control of air travel. The French particularly were known to be negotiating for Lockheed *Constellations* with which to put new life into Air France, their national air transport company. They were amenable, in return, to at least a temporary air agreement with the United States. The United States needed a pact with the French so TWA could begin its service to Paris, most important point on its North Atlantic route.

Sweden, with an excellent airline operating history, had formed an alliance with the other Scandinavian countries, Denmark and Norway, for a joint North Atlantic air service, and all three countries had signed agreements with the United States. The same was true of Holland, whose KLM line (perhaps the finest in Europe before the war) was being rapidly revived and equipped with American planes.

To top everything, Ireland had signed an agreement permitting U. S. lines to land without restriction on a number of flights. That meant, if worst came to worst, that American lines could refuel at Rineanna and fly on to cities on the continent, leaving the "tight little island" to meditate its folly.

This, briefly, was the situation on January 15, when the delegations met in Bermuda to attempt to compromise the issues left unsettled at the Chicago conference.

The U. S. group, headed by Baker, and bolstered by Army and Navy advisors and airlines consultants, was prepared to fight for the principles we had championed at the Chicago meeting: freedom from rate controls of the kind that would



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Regarded by the United States as a Magna Charta for the air traveler, the five freedoms formula provided:

1. The right to fly over a foreign country.
2. The right to land for refueling and servicing.
3. The right to discharge passengers.
4. The right to pick up passengers for return to the airline's home country.
5. The right of an airline of one country to pick up passengers in a second country for destinations in a third country.

The formula, which appears to be complex, can be simply illustrated: An air transport bound for Europe from New York exercises the first freedom in flying over Canada; to land in Newfoundland for refueling, it requires the first and second; to discharge passengers in England, it requires the first, second, and third; to pick up passengers for return to the United States, it requires the first, second, third and fourth; and if it were to take passengers from London to Stockholm or any other city before returning to New York, it requires the fifth freedom.

The British (and originally some other countries) were fearful of the fifth freedom, believing the American lines would take too much European business. The U. S. lines saw no way to keep out of the red unless they were permitted to carry passengers between cities along their extensive routes. Lacking such traffic, an American plane might discharge half its passengers at London or Paris, the great European gateways, still more at cities of secondary interest, and eventually arrive at the end of its run in China with but a handful of seats occupied.

During the 15 months between the Chicago and Bermuda conferences, the United States had made headway in its campaign for world-wide recognition of freedom of the air. Leading aviation authorities of some other countries had been persuaded that the best interests of travelers and of the aviation transport industry would be served by the American ideals, rather than the British. The question of rate control, however, was one on which Great Britain had virtually unanimous support from other nations.

Long accustomed to controls either by government or by private business cartels, European countries do not have the religious devotion to free competition that characterizes American business. They feared American competition. The British, it must be admitted, maintained consistently that they would accept the lowest rate that could be proved economically feasible; they wanted only protection against cut-throat rate wars.

For that matter, U. S. lines also desired rate regulation. The three north Atlantic carriers filed last fall with the Civil Aeronautics Board a resolution asking it to approve the International Air Traffic Association's rate-fixing machinery as a means of arriving at fare agreements.

The position of the United States on the rate question was weak, however, because the CAB does not have the power to control international fares as it does domestic fares. The board's authority over international rates is limited to approval or disapproval of rates fixed by agreement among carriers. It has no authority over a rate fixed by an individual airline for an international haul. Unwilling to make a decision without knowing what disposition would be made of other issues in the international fracas, the board did not rule on the airlines' resolution. Instead, the board members attended the Bermuda conference as members of the delegation, holding private meetings on their own related problems as the negotiations developed.

The conference opened with the usual exchange of polite amenities. Formal speeches by Baker and Self offered little clue as to the course the maneuvering might follow. An indication that a new sentiment for a more liberal policy might be growing among the British appeared, however, in an opening statement by Sir William Hildred, director general of Britain's civil aviation who was soon to be succeeded by Self.

Both men were top civil servants of long experience and high reputation. Hildred was making what might be his last official appearance for the British government, since the International Air Traffic Association had already hired him as executive director at a salary reported to be about $40,000 a year. He proved to be a powerful leavening influence, and may be credited with solving some of the conference's most critical problems.

The conference produced an arrangement that a majority of the carriers represented in the negotiations regard as a practical charter for world flying. Under the arrangement, air transport may expand as rapidly and freely as travelers demand and technology permits. Terms of the agreement allow airlines of both countries great flexibility of operation. The principal provisions are:

1. Fares are to be set by the lines, subject to governmental review.
2. Fifth Freedom rights are granted under general rules designed to prevent air lines of either country from operating local, rather than international, flight schedules.
3. Air lines of both countries may operate as many flight schedules as they choose, without limit on plane capacities.
4. Both countries laid out routes covering the world.
5. "Change of gauge" in airplanes is permitted.
6. The CAB approved IATA's rate-fixing machinery for one year, and will ask Congress for legislation cloaking it with the same authority over international fares that it exercises over domestic rates.

Two devices were adopted to keep the aviation policies of the two countries in harmony. The first, intended to erase differences before they assume the proportions of outright disputes, provides for continuous consultation between the governments by exchange of liaison officers.

Should negotiations between the governments fail to compromise differences over rates or any other question, the second method calls for reference of the dispute to the Provisional International Civil Aviation Organization (PICAO) for investigation and an advisory report. The PICAO report will not be binding, but each country agrees to do everything possible to adopt PICAO terms.

The level of rates is obviously the most dynamic problem the two countries will have to deal with. Until the CAB is given direct power over international rates, the agreement provides that either country disapproving a rate proposed by an airline of the other "may take such steps as it may consider necessary to prevent the inauguration or continuation of the service in question at the rate complained of. "This applies, of course, only if the disagreement is not settled either by consultation or by reference to PICAO." By this rule, the British preserve their power to prevent an American line from setting a rate they consider too low. In short, Great Britain may cancel U. S. flight schedules, as was done last December when Pan American offered a $275 fare from New York to London.

After the CAB acquires rate fixing authority, the situation will change completely. If after 30 days the governments cannot agree on a rate proposed by an airline of one country or the other, the rate may go into effect provisionally at the discretion of the government of the

airline offering the disputed fare, pending settlement of the issue either by further consultation or by an advisory report from PICAO.

L. Welch Pogue, chairman of the CAB, in announcing the board's approval of IATA's rate-fixing system by vote of three to one, emphasized that the board will protect travelers by insisting upon frequent IATA conferences to reduce fares as rapidly as decreased operating costs and rising traffic densities warrant. No rate will be approved for a period longer than a year, Pogue indicated.

The agreement is to run indefinitely. It has no specific life term. Either country may propose amendments at any time. Pending the outcome of negotiations over an amendment proposal, either country may serve notice of its intention to terminate the agreement and, if an accord is not found, the termination is effective 12 months after the serving of notice.

Terms governing fifth freedom traffic are concerned only with principles. Their workings are left to arrangements that will be made in the light of experience. The three controlling factors are traffic requirements between the country of origin and the countries of destination, requirements of through airline operation, and traffic requirements of the area through which the airline passes after taking account of local and regional services.

Therefore, at present an American airline may pick up as many passengers as it wishes in London for Stockholm and other cities along its route. It might start only five passengers for Stockholm from New York, and pick up 20 in London. Assuming that over a long period the line originated only an average of five Stockholm passengers in New York, the British might propose a limit of some sort on London-Stockholm fifth freedom traffic under the first governing principle, "traffic requirements between the country of origin and the countries of destination." The American line might invoke the second principle, "the requirements of through airline operation," to prove its economic need for more London-Stockholm passengers. Either country might find the third rule convenient for its position, depending upon the adequacy of local services. Conversely, the same rules apply to British operations, such as fifth freedom traffic between New York and Montreal, San Francisco and Australia, or any other fifth freedom operation British Overseas Airways establishes on its routes.

The fifth freedom rules and standards for "change of gauge" were among the hardest fought in the conference. The term "change of gauge" means substitution of a smaller for a larger plane, and the U. S. lines wanted this right as a means of reducing costs toward the ends of their routes, where traffic densities decrease. Winning their point, they will be able to base twin-engined planes in London to carry passengers to points beyond. They will not be forced to operate four-engined aircraft for a few passengers.

British opposition to the principle appeared to be based primarily on the fear that the American lines might establish "merry-go-round" schedules competing with their European services, a type of operation none of the U. S. companies actually intended. Consequently, the change of gauge privilege was hedged with the rule that the smaller plane will be operated only as a connecting service with the larger, and will wait on the arrival of the transatlantic flight.

Both countries laid out route patterns, and agreed that neither would make route changes in the territory of the other without agreement between their aeronautical authorities. The British were given the same U. S. terminals as the American lines: New York, Boston, Philadelphia, Washington, Baltimore, Chicago, Detroit, Miami, West Palm Beach, New Orleans, and San Francisco. Either country may make route changes in third countries at any time, simply by giving notice to the other government.

In addition to the general transport agreement, the conference produced "heads of agreement" opening to commercial operations the military airports built by the United States on British territory under 99-year leases obtained in trade for 50 destroyers in 1940. By this document, the governments are committed to include its terms in a final agreement yet to be worked out. Problems not solved at the Bermuda meeting deal principally with customs regulations and taxation, phases of the general question of the extent to which British colonial authorities will be permitted jurisdiction within the military areas.

Military rights of this country were rigidly protected. Colonial administrations will be permitted to penetrate the bases only to the extent necessary to perform the normal functions expected at a commercial air passenger terminal. In commenting on the arrangement at the close of the conference, Maj. Gen. Laurence S. Kuter, commanding general of the north-Atlantic wing of the air transport command and head of the group of American military advisors, said:

"Civil use of these bases will be of substantial benefit to international aviation and without prejudice to complete military control of the bases by the United States."

Kindley Field at Bermuda, Coolidge at Antigua, Beane at St. Lucia, and Atkinson in British Guiana will be used regularly by commercial lines. The bases in Trinidad and Jamaica will serve as weather alternates, as there are airports in both places suitable for airline use.

The U. S. initialing of the bases document was contingent upon the eventual making of "satisfactory" agreements with Canada and Newfoundland, which have a voice in their own affairs because of their dominion status, for the use of bases in Labrador and Newfoundland.

Canada leases the great Goose Bay field in Labrador, which is a dependency of Newfoundland. The U. S. bases in Newfoundland are Harmon (at Stephenville) and Argentia, the smaller of the two. Newfoundland has designated its own big base at Gander as the dominion's international airport. Whether Harmon and Argentia are to be used as weather alternates, or as regular bases, is a question yet to be settled. END

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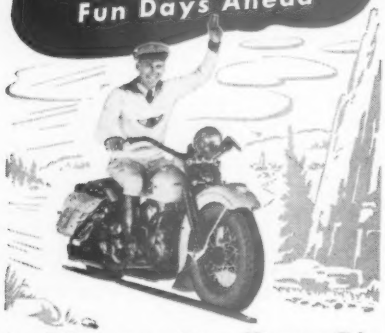

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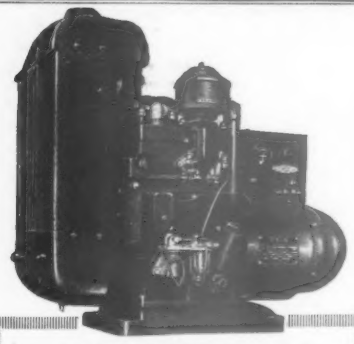

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Wing on a Pivot

(*Continued from page 44*)

transferred to a small lever mounted at some convenient point on the instrument panel. The pilot would then set this adjustment to the desired position—take-off, cruise or high speed. To land, it would only be necessary to close the throttles and steer to a desired landing spot. Take-off would be a matter of opening the throttle and steering while taking to the air.

To a person accustomed to driving a car it is most disconcerting to have a wheel that moves back and forth. I became so convinced of this that in 1942 I built a small flying boat, having only a throttle and a fixed steering wheel for control. To test this principle in its simplest form the wing was hinged at a pivot chosen to give a speed slightly above the minimum, as a compromise between take-off and cruising. There was no method used to change the speed.

In other words, the craft would take off, fly and land at only one speed. This airplane was undoubtedly the easiest ship to fly that I ever operated. If it had not been for a slight oversight in design, it would still be flying.

The oversight was the fact that the c.g. of the wing was some distance behind the pivot point. In smooth water landings or take-offs this caused no trouble. But once, after taking off, the water did not stay smooth and the landing was made under rather rough conditions. The impact of the hull on a large wave, in itself, tends to throw the plane back in the air. This, coupled with a sudden increase in attack of the wing due to the c.g. being so far behind the pivot, caused the craft to go back up in the air without sufficient flying speed. The next time it came down it did not stop at the surface of the water!

In order to make this idea practical, it would be necessary to move the wing pivot fore and aft in relation to the wing in some manner. The slope of this moment curve in respect to the zero line is quite constant through the normal operating range, but becomes much steeper at the low speed or landing region, exactly as is needed for high recovery forces in short recovery times while landing or taking off.

The controllable wing, when applied to a flying boat, yields some unexpected and attractive results. It permits the use of an entirely different design of hull from that used on conventional flying boats.

To an outsider it might seem that designers of flying boats are generally unaware of the latest advancements in boat design. They still consistently place the engine high above the water, making it necessary to go back to the Polynesian method of preventing capsizing with outboard floats.

Fortunately, the optimum length of a two-passenger version of our flying boat closely coincides with the length of the average two-place racing boat operating at speeds comparable to the take-off speed of the aircraft.

Using the controllable wing it is not necessary to pitch the hull to vary the angle of attack. Neither is there any overhang aft of the stern to support the tail since no tail is necessary. The hull design is no longer a specialized problem, but the designer may use, with little change, the lines of the most successful speed boats now in operation.

With the stern used on this flying boat, it is possible to place the engine in the bottom of the hull to give the necessary stability on the water. In fact, the position may be almost identical with that of the surface boat. The only difference is that the shaft slopes rearward and upward to an air propeller directly over the transom instead of sloping rearward and downward to a water propeller.

Location of the propeller in the plane eliminates the possibility of spray entering the propeller disc, regardless of wind or water conditions. At the same time it permits the propeller tips to operate only a few inches above the water level.

Engineering research on the Spratt controllable wing is being continued at Convair's San Diego plant. Development is promising but, after all, the conventional airplane has had more than 40 years of research while the controllable wing, to date, has had only 100 hours of flight testing. END

Pilots—Mind Your Manners

(*Continued from page 41*)

plane evidently thought it was and he was going to show me! Instead of making a safe, high approach, he dragged his plane in low and aimed it right at us. On and on he came. The co-pilot left his seat and dived into the aisle but there was nothing for me to do but watch.

When the small plane was right on us, he hit a down draft. I could see the little yellow propeller speed up as the pilot gunned the engine. He just did miss us with his tail wheel dragging across in front of our windshield!

The irony of it is that this lightplane pilot, who deliberately made a short approach on a 6,000-foot runway just so he could scare us, would have died as quickly as the co-pilot and myself if he had hit us. Those are the percentages in aerial discourtesy.

On another occasion, the tower told me it was okay to make a right turn into the field. When I was on the base leg the tower advised me to make a short approach as there was another plane making a left turn into the field. The other plane was on a long base leg and, with a short approach, I would not have disturbed its normal approach.

I proceeded in on a short approach but kept an eye on the other plane because I could see blue smoke pouring from each of the exhausts, an indication to me that the pilot had poured on plenty of coal.

Sure enough, as I turned in on final approach and had just gotten the plane squared away with gear and flaps down, the other craft practically flew in my

window. Legally, the other pilot knew he was right. But had he proceeded at normal sped I would have landed minutes before him. Not to be outdone, the other pilot had gunned his engines and actually had crowded me out of final approach position. And the disappointing thing about it all was that the other plane was merely shooting landings, time was meaningless to him. Yet he wanted his right-of-way and, in getting it, put the lives of over 25 people in jeopardy.

Any pilot could cite innumerable illustrations of how far we have traveled from the cordial era of aviation. I taxied toward a terminal building the other day and on the way in noticed the control surfaces of a plane being banged about by the gusty wind. I picked up my mike and told the tower that they ought to advise the owner of the parked plane that his controls might be damaged by the wind. They said they would advise the owner.

I pulled up to the building and while I was filling out my log book someone called up to me. I looked out of the window and saw a slender youth staring up. "Listen you," he snapped, "you fly your damn airliner and let us handle our planes! I never had wind damage to controls yet, so quit popping off your mouth."

There was nothing I could say to the man. Yet I remember not long ago when it was considered an unwritten law of aviation to advise another when you thought anything was wrong with his plane.

A little test I once conducted seems to indicate that politeness and consideration actually go hand and hand with flying skill. Many years ago when I was mechanic for the airline for which I now fly, I checked the pilots who ran their engines up near our hangar.

This hangar, with its open doors, was located at the end of an often used runway and the pilots could run their engines up so they filled the building with dust and dirt. They could, with a little effort, however, turn the planes so the prop wash would not blow our way.

Whenever a pilot would blast our hangar full of dirt I would jot down his plane number and the time. Then after work I would go over to the dispatch office of the airline and check up on the pilot who had tried to blow us down.

Invariably, the pilots who habitually blasted the hangar with their prop wash were those with the poorest airline record; the pilots who turned their planes so the prop wash would not come into the hangar always had the better records.

We know that all pilots will not be courteous but we can get the ball rolling if we remember that when we are in the air we are a clan . . . we are a different people. And one way to get started is to obey this simple rule: when you pass a plane in the night, blink your lights—make it mean "howdy." END

Variable Pitch: The Lightplane's Gearshift

(*Continued from page* 60)

makes about as much sense as putting an overdrive in an Austin automobile. The benefits would be negligible. Accordingly, there have been few variable propellers recommended for installation on engines of less than 65 h.p.

From 65 h.p. up, the advantages become very real and have been demonstrated repeatedly on many popular light and medium weight airplanes. Replacing a fixed-pitch propeller designed for high-speed cruise with a variable-pitch unit immediately results in a sizeable and important increase in available power. Engine r.p.m. may rise several hundred in low-pitch at take-off power and static thrust will be increased substantially. Accordingly, the take-off run will be reduced as much as ⅓, depending upon the installation, and rate of climb will be increased proportionally.

High pitch, for speed at high altitude, allows the pilot to select the most economical cruising speed, or attain a higher speed than is obtainable with the fixed-pitch propeller. This gain actually has amounted to five to 20 m.p.h. for aircraft having engines of 100 h.p. or more. Service ceilings have been increased several thousand feet in some cases and in most every instance are improved. Aerobatics and other training exercises are benefited if the propeller changes its pitch without pilot attention.

A variable-pitch propeller does save fuel costs by affording the most efficient utilization of engine operating output. However, the saving is not large for private flying. Scheduled air carriers using large quantities of fuel, logically can expect to make or lose money on the basis of fuel economy. But, with the relatively low annual fuel consumption of the average individual lightplane, savings can best be expressed in extension of cruising

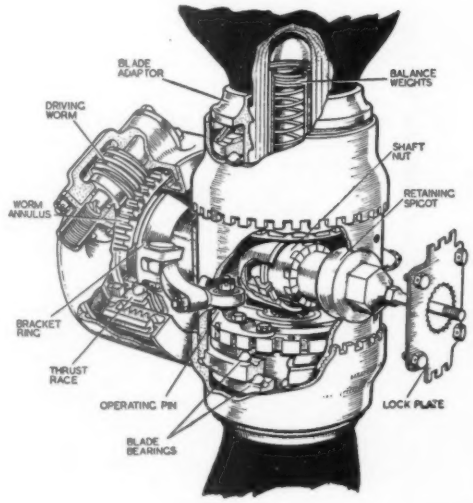

Figure 6.

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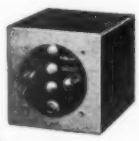
The RANGER Model 210 Transmitter matches the Model 117 in weight and size, yet puts out a *powerful* signal. Both the "117" and the "210" may be operated from a single battery pack.



RANGER VHF equipment will be ready when CAA VHF facilities are established. Authorities advise that present frequencies will be continued for several years after VHF ground equipment is installed.

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range rather than in terms of money.

Although exact statistics are not available, it can be assumed that engine adjustment and overhaul periods will be farther apart with variable props than with fixed-pitch propellers.

Safety in operating an airplane is of incalculable value. Considering the ability of the variable-pitch propeller to permit full power output when needed, take-off and landing emergencies will be much less hazardous. Further, engine malfunctioning will be less critical when the torque on the engine can be reduced by pitch change.

Because of the number of variable-pitch designs advanced during the past 10 years, there is an abundance of design material to evaluate. Designs have varied enormously. Some are manually operated by the pilot, some function by themselves, while others use auxiliary hydraulic or electric power for pitch change.

Good fixed-pitch propellers generally cost from 50 cents to just over $1 per h.p. However, a good share of the cost of even the fixed-pitch propeller is involved in the metal hub, indicating the relation of machined parts to total cost. Obviously, a variable-pitch propeller will have a considerable number of metal parts, hence higher cost.

Although wartime experience in methods of fabrication and new technical developments have improved propellers as mechanical units, labor and material cost increases as well as a modest market have combined to keep prices up. Most small variable-pitch propellers, depending upon their complexity, will cost $2 per horse power and higher, or more than twice the cost of fixed-pitch types. However, dealers who have encountered the demand for improved propellers explain the pricing situation this way: any pilot who uses his plane for any reasonable period of time wants another propeller with different characteristics of take-off or speed, thus almost doubling initial cost. Damage or warpage of the fixed-pitch propeller results in replacement of the whole wooden piece, again increasing investment which could have been avoided by having a variable-pitch propeller which gives all-round performance characteristics and has individually replaceable blades.

Whatever the arguments may be, if a pilot wants a propeller for his 150-h.p. airplane he will have to pay about $300 for it. If the prop is selected by the plane manufacturer to help sell the airplane, he may get it as standard or optional equipment.

A glance at the development story of present day propellers for high horsepower will indicate a misconception about small prop features. Every single feature of modern large propellers, i.e., constant speed, feathering, reversing and high rates of pitch change, have come about slowly as progress demanded them.

Similarly, a small propeller has no need for a host of features not actually demanded. Thus, unless the application is a twin-engined, medium-class airplane, feathering is useless and exact constant-speed governing is a luxury if it entails expensive and intricate devices. Auxiliary power for pitch changing is one way to achieve operation easily but often results in too complicated an installation.

Figure 6, from the British magazine *Flight*, shows a perspective-sectioned view of a discontinued pre-war light propeller design in which pitch change was accomplished by a pilot-operated crank. A worm at the engine nose case shifted a yoke fore and aft, effecting a pitch change through linkage to blades.

Analysis of this design indicates some of the principal features involved in the operation of any light propeller. The hub unit is reasonably simple but has exposed mechanism and numerous points of wear plus requiring airplane modification or special adaptors. Figure 5 is a plan of installation showing the operating rod from propeller to pilot crank. To tell the pilot where the blade angles are positioned, a mechanical pitch indicater is built into the instrument panel crank housing. Without this indicator the pilot would only have his engine tachometer to indicate correct or incorrect propeller setting. Even with the indicator, education is required before proper settings for all conditions can be made. Also, most lightplanes lack manifold pressure gauges which can be used as a guide to correct power absorption. However, it would almost require an exhaust gas analyzer to co-ordinate all propeller settings with economical power output.

Further, to crank the propeller into low pitch in an emergency adds another duty to an otherwise busy operation. If not foolproof, propeller controls must be, at least, fool-repellent. Complicated instructions and limitations on installation will rule the propeller out. Private flying has no place for gadgets which require more than average instruction.

When governor control and feathering is added to a crank-operated design for an elaborate single and/or twin-engined application, the installation becomes much more complicated. Connection of the governor to the throttle relieves the pilot of all attention, while a pitch indicator is retained and selector switch and feathering control are added. Such a control system is about twice as expensive as the pilot-operated unit and not a great deal less involved than a high-horsepower type.

Service and maintenance of the small propeller must be almost as mechanic-proof as operation is fool-repellent. If maintenance provisions have not been included in the original design (in some cases they have not) service in the field will rebound unfavorably. As it is, whenever possible, everything from engine misfiring to instrument panel vibration is blamed on the propeller.

Weight of any variable-pitch propeller is naturally greater than fixed-pitch types but, in most instances, not excessive. Generally, weights run on the order of less than .20 pounds per h.p. in the lowest brackets and even better as power increases. This weight includes the hub and blades only, control systems add more. Automatic and other self-contained propellers having no control systems are lighter.

Unless factory installations are made, weight and balance checks will have to be conducted whenever propellers are installed. Certain types of installations will require modification of the airplane and engine, entailing expense unless the major components manufacturers recognize the possibility of later applications and include structural modifications.

In the final analysis, the lightplane variable-pitch propeller will be accepted in everyday flying by pilots who find it worth the increased airplane performance, by mechanics who don't find a nightmare of machinery and by dealers who can install a unit and do not have to spend an hour on operation instruction. One flight with a good inexpensive variable-pitch prop will sell a fixed-pitch owner. END

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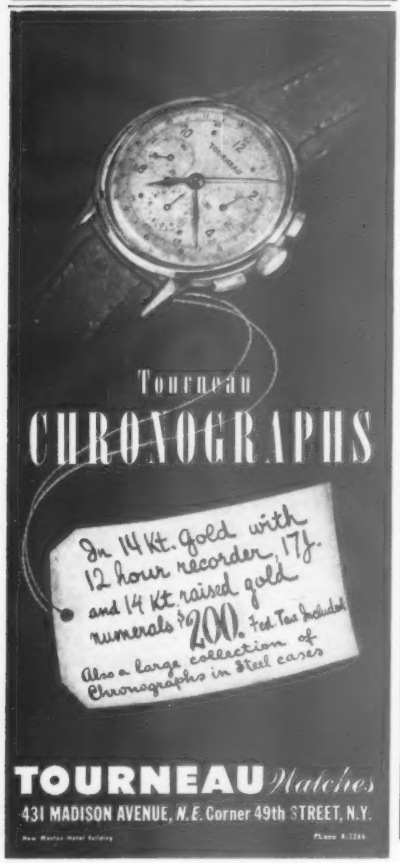
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Letters

(Continued from page 80)

try at the present time use their equipment only about 10 per cent of its potential working limit. First, the weather makes flying impossible on a good many days. Second, most flight schools use their equipment evenings, Saturdays and Sundays. Third, CAA requires operators to keep equipment in airworthy condition. If the uncertainty of the weather could be eliminated and more people encouraged to fly, the final cost to the student or pilot could be reduced.

Some of "The Bitten" have stated that they are not going to fly until they can afford to buy an airplane of their own. But the operator must invest money in airplanes regardless of cost, store them and insure them, maintain them in an airworthy condition, be on hand 365 days of the year to give service to any person who may casually drop in to rent an airplane or take a half-hour lesson at his convenience.

One of the main causes for high rental rates is the industry itself. The design and manufacture of aircraft contributes to the cost; also the high-grade but little-used materials and the low volume now being produced. Maintenance and repair are important factors, too. All of these things make it impossible for any operator to cut the prices down to what some of "The Bitten" feel they should pay.

As I see it, the cost of flying is entirely in the hands of the customer. Flying is unquestionably more expensive than motoring, but motoring was pretty expensive right after World War I and it is quite possible that if some of these complainers live long enough, prices for everything aeronautical will be such that even they will not begrudge spending money for it.

RONALD KLISCH
The Klisch Flying Schools
Forty Fort, Penna.

Aeronca has tried to do something about "The Bite" [FLYING, February, 1946]. We recently issued a new flat-rate manual with which an operator can check time spent on a job, multiply by his hourly rate, add the price of parts and arrive at an accurate figure. We believe the manual will reduce repair charges.

An extensive survey among our dealers and distributors indicated the private owner did not so much object to high charges for repairs as he did to abysmally incorrect estimates. We know the operators' problems. Not all of them are equipped to make repair time studies. Most have been bitten themselves. Therefore, we asked our distributors and dealers to help and Aeronca service crews worked for one month checking time and parts costs.

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LATHROP B. NELSON, MANAGER
Service and Parts Dept.
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"The Bite" stated that manufacturers are afraid of losing good salesmen by mentioning lower rates to fixed-base operators. They can get better salesmen than they ever had before if they really want them. There are hundreds of car dealers in this country, with sales knowledge and experience, who are willing to become fixed-base operators if given a chance.

Have you ever tried to get a franchise? Try it. You'll find all territories are closed except a few desert counties out west. Why? Because the base operators now in business have them. But let CAA relax on distance between airports and see what happens. Competition would drive the chiselers out of business and bring the rest of them in line in a hurry.

There would also be a closer relationship between dealer and manufacturer because both would be working for a common cause—safe, cheap air transportation for business and pleasure, within reach of the man with a $3,000 a year salary, instead of the $7,000 or $8,000 a year man.

A. A. HIXENBAUGH
AOPA 17839
McKeesport, Pa.

Report from Washington

(*Continued from page 55*)

national aircraft trade exposition and flight demonstration." A national convention of NAA is to be co-ordinated with this one, which will headquarter at Offutt Field, Ft. Crook. The Fair is being sponsored by the Knights of Ak-Sar-Ben, which is Nebraska to you, if you read it backwards. The Knights are expecting a quarter of a million customers and 2,000 lightplanes. Proceeds will go to charity . . . And in case anybody thinks the Omaha show isn't going to be like old times, look who's running it for the Knights: Steadham Acker from Birmingham, Ala., who made air show history there and at Newark and Denver, and more recently set a new high in such matters as program director for the National Aviation Clinic at Oklahoma City.

CAR—Part 04

The new Civil Air Regulations, Part 04, adopted by the Civil Aeronautics Board, has made a drastic change in airworthiness requirements by eliminating all fixed numerical limits on stalling speeds of transport aircraft.

The new requirements will stress ability to climb at a pre-determined minimum rate both at full power output, and with certain engines stopped. This, together with a mandatory stall warning device and, possibly, longer runways, is expected to maintain safety.

The decision of the CAB, which became effective on last November 9, makes it mandatory for air carriers to comply with the new Part 04 on all planes of which the prototype is flown on or after January 1, 1948.

To comply with the new restrictions, an aircraft with one engine inoperative, in cruising configuration at 5,000 feet, shall have a minimum rate of climb which is equal to two per cent of the stalling speed up to 40,000 pounds, varying linearly to four per cent of the square of the stalling speed at 60,000 pounds and above.

A minimum requirement is also demanded of four-engined airplanes with two engines inoperative.

The CAB is vague about the make-up of the "stall-warning" device but states that it must be "clear and distinctive," shall be apparent to the pilot at a speed at least five per cent above the stalling speed with flaps and landing gear in any position, and in either straight or turning flight.

Take-off weights, under the new ruling, may be certificated at 105 per cent of the landing weight without means of dumping fuel. Higher take-off weights may be authorized if it is possible to jettison fuel rapidly enough to reduce landing weight at a rate of one per cent a minute. The absolute maximum allowable is 130 per cent of the landing weight.

As an additional point of importance to operators and manufacturers of transport type planes, the CAB has made revisions to Parts 04, 41, and 61 which make the following requirements:

"The steady rate of climb at 5,000 feet with all engines operating at maximum continuous power, and the airplane in the cruising configuration, shall be not less than eight times the stalling speed. The operating rules will prescribe a rate of climb of six times the stalling speed at 1,000 feet above the highest terrain en route.

"The operating rules will prescribe that an airplane with four or more engines will not be dispatched over a route from any point more than 90 minutes at cruising speed to be used to suitable landing area, at a weight greater than would permit a rate of climb, with two engines inoperative of one per cent of the square of the stalling speed. This formula applies at an altitude of 1,000 feet above the highest terrain en route, or 5,000 feet, whichever is higher."

Copies of the revised Part 04 can be obtained from the Government Printing Office, Washington, D. C. The price is 45 cents.

A & E

The United Pilots and Mechanics Association is not a little perturbed at the "necessary and essential" clause in CAA's instructions to the field on appointing Aircraft Maintenance Inspectors. "Necessary and essential," the Association points out, will get designations for not more than 3,000 A & E mechanics, leaving the

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rest of the 20,000 without designation. "The instructions for appointment make no pretense of complying with the recommendations of the CAA Non-scheduled Private Flying Advisory Committee," says the associaition. The Advisory Committee suggestion was that every mechanic who meets certain reasonable requirements and has a fixed base of employment should get a designation regardless.

UPMA is inclined to blame CAA field offices for another CAA appointment difficulty—for private pilot flight examiners. Bill Moore, CAA chief of general inspection, stated Washington policy recently in Atlanta when he told inspectors to appoint "as many qualified private pilot examiners as there are qualified instructors to hold them." But appointments are slow. "A little more co-operation from regional offices would help a lot," is the UPMA comment.

Briefings

The life of an airline hostess is not an easy one. PCA has now installed in its "Capitaliners" a hostess-to-passenger public address system.

The first post-war international delivery of a commercial airliner by a U. S. manufacturer to a foreign country took place recently when a DC-4 landed in Melbourne, Australia. Purchaser was Australian National Airways. Douglas Pilot Bill Morrisey commanded the plane.

Private pilots who buzz the girl friend are getting little sympathy from the CAB. Cases appealed to the Board recently have resulted in revocation of certificates for a year.

Gliders are coming back. The first ever to be delivered through the air from factory to purchaser and the first civilian job to come from any factory since the war went out from S. Schweizer Aircraft Corporation, Elmira, to Columbus, Ohio, recently. Paul Souder, in charge of glider sales for the Jones Flying Service, which bought the new model, was at the controls. Verne Hysell piloted the towplane, an Interstate with a 65-h.p. engine.

Speaking of gliders, we're told by "Tip" Tippett, CAA's Argentine expert, that gliding is a great sport down there. The kids go up and stay all day, taking their lunches with them. One enterprising glider pilot has thought up a new game, too. He takes along a horn and when a bird comes close he honks at it. Nearly scares the bird into a flat spin.

The Schweizer job is called the SGU 1-19, a single-place utility glider which will be sold ready-to-fly and in kit form for schools.

Eight veterans have returned to CAA recently—mostly from the AAF. Col. Howard Rough has become special consultant to Administrator T. P. Wright, after service in the ATC, and—a lucky break for anybody's outfit—Col. Bennett H. ("Benny") Griffin has returned to CAA's Washington headquarters after service all over the world. The world has been Benny's beat off and on for years. With Jimmy Mattern he flew nonstop from Newfoundland to Berlin in 1932 and later almost made a record-breaking flight around the world. END

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Let's Be Realistic About Private Flying

(*Continued from page 21*)

Most people have a cockeyed conception of what lightplane air travel really is. It is a poor-man's means of transportation to and from inaccessible places for medium-range trips. It is of primary value when time is important. And, therefore, it is bound to have weaknesses.

But a recent trip to Miami cost me and my flying companion about one cent a mile each. Automobile and railroads to the same destination had to go over set routes which cost millions of dollars to build (including highways, rails, roadbeds and bridges). They had to follow their fixed courses. We, on the other hand, could go as we pleased in about 16 hours, limited only by our airfield terminals.

In general, I agree that aviation has been oversold. Before the war there had been no volume production of any type of aircraft. The military aircraft manufacturers were able to get some production, with their bills paid by the Army and Navy, but we in the lightplane field had no Uncle Sam to foot the bill.

Dealers, distributors and manufacturers all have been guilty in the past of selling lightplanes to people who soon discovered little utility in them. But these were often due to circumstances over which we had no control. A really good lightplane engine did not appear until 1939.

Remember, too, that the average person is gradually getting used to the idea of air travel and it's a slow process of development. There was a time when our lives were controlled by horizons which we could reach only by walking; then came the horse and buggy; then the trolley; then the automobile. We are just coming into the air age. We are only now getting educated to longer trips—just as it required two decades for the automobile to get into wide public use.

Our orientation to this revolutionary new means of travel must necessarily be slow. It has been predicted that by 1955 America will have 500,000 planes. I question it . . . it's just a wild guess. I wouldn't attempt to estimate myself for there are too many critical factors—such as the poor engines until 1939 and the CPT program which pushed sales way out of proportion before the war.

At that, 500,000 planes is only about 1.5 per cent of the 30,000,000 automobiles expected to be in use in the near future. Detroit builds more autos in a day than all aircraft companies build planes in a year. The automobile is incorrectly and unfairly used as a basis of price comparison. It will be a long, long time before we are anywhere near its class in volume of production.

The lightplane is an excellent means of travel from metropolis to small town or between small towns. It is also an excellent means of transportation via these new "Fly-Yourself" systems for traveling salesmen and other pilots who have to do considerable cross-country traveling. Such planes will make it possible for our young military- and naval-trained pilots to fly when they desire and eliminate the problem of plane purchase by those who can't afford it. For persons who wish to travel from metropolis to metropolis, airlines and rail service are the answer.

For greater utility we still need a much better airport system. Airports should be as accessible as possible. And they should be free, just as our highways have been for 50 years. Our airports will cost a lot of money and take time to build. We should start with sod fields and then develop them as increased traffic warrants. They should be all-direction so that landing and taking off into the wind is always possible.

In this connection I also take issue with the widespread complaints of poor airport service. I have seldom, if ever, received anything but fine treatment at any airport. There's no sense in having an airport restaurant where only one plane arrives daily. Considering the business volume, customers get good service. Personally, I never was one for getting bellhops to carry my hat, coat and baggage. I'd rather do it myself.

In any field as young, dynamic and revolutionary as aviation, there are bound to be different aims between different organizations in the field. Among agencies which have been criticized, or which have expressed criticism of others, are the Aircraft Owners and Pilots Association, the Civil Aeronautics Administration, the National Advisory Committee for Aeronautics, and the Aircraft Industries Association. Criticism is healthy. It causes us to reexamine ourselves, sometimes for the better.

We agree with AOPA's desire to reduce prices, and we have always been interested in such policies. In attempting to manufacture a low-cost plane we designed the one-place *Skycycle* which we hoped to sell for $1,000. We soon learned that the cost of raw materials, equipment, the engine, and the dealer's fee amounted to about $1,000. That left nothing for assembling and manufacturing.

We know that auto engines are low-priced. But weight doesn't matter to automobiles and production volume permits use of expensive tools, which then reduces production costs. We won't have the $1,000 plane until our sales volume goes much higher and airports and hangars are much more plentiful. And besides, it is more important now to house babies than to house aircraft.

We believe that the CAA's emphasis on training, although improving of late, has been wrong. They have stressed non-essentials such as precision flying, fancy maneuvers, dull circling of the airport until licensed.

Yet most accidents occur from buzzing ground objects, from tight turns, or from turns in a climb. Such maneuvers may be okay for high-powered aircraft but not for lightplanes. Lightplanes, like all aircraft, must maintain flying speed. They must stay away from near-stalling speeds and this lesson should be drilled into all pilots thoroughly.

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you are very soon driving somewhere along a highway. You don't have to keep on driving around the block as you are now required to circle the home airport. Novices should be permitted to start flying short cross-country hops early in their training and then make longer hops gradually until they are experienced in that sort of flying and can get some utility as well as pleasure out of their initial flight training.

It has been charged that lightplane research is everybody's stepchild and no ones' responsibility. In the past, our sales volume was so small that we could not spend much on research. Our own company now has the largest experimental setup, including engineers and factory employees, that it has ever had. It amounts to 10 per cent of our total personnel of about 2,000 (by June we should be employing 2,500).

During the war the Army paid for the salaries of many research experts. Now we have to pay for them ourselves.

There have been many wing and airfoil designs. Every time we have heard of a new airfoil we have experimented with it, but, for our type of plane, we have never discovered an equal to the wing we have been using for 15 years.

If lightplanes are a "poor third" on NACA's research program, it is absolutely not due to a lack of interest on the part of the manufacturers. It is natural that military aircraft get first call. They are more spectacular, what with jet, gas turbines, radar and so on, and they present more interesting and remunerative research problems. It follows logically that manufacturers of military aircraft should get the airline business. They have had an "in" with Washington for years through their large engineering departments, and their contacts with those in authority provide an excellent opportunity for gaining Government support.

Certainly, no one could agree with the statement that pure research is ended in the lightplane field. Very little has been done, but very little has been offered us by such Government agencies as NACA. Only recently have they even considered us. I'll bet the average lightplane manufacturer isn't even aware what NACA is doing because their contacts with us have been so limited. Now prospects of NACA aid are better.

Now that the CAA's request for lightplane research funds has been denied, can we carry on in reducing propeller and exhaust noises, simplifying controls and getting cheaper engines? We can and will, even if no Government agency lends a hand.

The problem of exhaust noises is being worked upon with considerable success by many companies. Less propeller noise is one for the engine companies to handle —it can be done by a gear which makes a larger prop run at reduced speed. Controls on all lightplanes are not complicated and I do not consider that so-called "simplified controls" are especially desirable.

We all would like to have cheaper engines, but there's a saying: "We'll have 100-h.p. engines weighing 100 pounds for $100—in 100 years."

Another research problem which has been suggested is the roadable plane. Personally, I haven't reached the point where I want to push a truck off the road with my lightplane. Just tick an auto and your plane is in need of major repairs. Turn over in an auto and often you can straighten the fender, check for gas leaks, and start on your way again. Also, roadable aircraft, being neither fish nor fowl, would be clumsy and require heavy and expensive apparatus. The solution is that sufficient autos and taxis be made available at airports.

L. P. Sharples, chairman of the executive committee of AOPA, has proposed an 18-point research program which includes cheap blind-landing apparatus, collision warning devices, wing design permitting 200 m.p.h. cruising and 35 m.p.h. landing speeds, a 150-h.p. engine weighing not more than 150 pounds, reduction of noise and vibration, cross-wind landing gear, a light, cheap, cartridge starter, and other developments.

We like these, naturally. But most folks, for example, can't afford gasoline for 200 m.p.h speeds. Cross-wind landings I object to. Tricycle gear have their advantages and disadvantages as well. They are not good on soft landing fields and once a nose wheel goes, where are you? It is much safer to land and take off into the wind. We should have all-direction landing fields. Landing lights and so forth are nice but they add weight and gadgets to the lightplane—and weight is very important.

Criticism has been expressed of the fact that lightplane manufacturers are producing just as many planes as they can today without holding them off the market until more research can produce new aircraft designs.

No one has manufactured personal planes for four years and we feel we are justified in giving the public what we have rather than nothing at all. If we had to do it over again we would do it the same way.

I can see nothing wrong with what has been called "a build 'em and sell 'em policy." Many people depend upon lightplanes for a livelihood. If a man has been starving for a week, you give him food. Likewise, if he needs shelter, you give him a roof now. The fancy, super-duper stuff can wait.

In a recent article in FLYING [February, 1946, page 24] former Lieut. Wilfred Owen objected to blaming the pilot for the vast majority of aircraft accidents. He is right to a certain extent, but more often than not it is the fault of a pilot when he gets in a jam. I believe the industry has room for improvement in which the pilot will be aided when in trouble that may be of his own making.

Our *Cubs*, for instance, are designed simply, and that of itself should aid the pilot greatly. In some types of aircraft the pilot may become confused because the location of controls is confusing. He may forget because there is too much to remember. But this doesn't apply to most lightplanes.

I don't believe that sloppy airport management has much to do with taxiing accidents, for it isn't as easy to judge distance in a plane with its sizable wing as it is to judge distance in an auto with four wheels reasonably close together. Also, the airplane is far frailer in construction.

In the majority of cases the pilot is wrong. There are many circumstances over which he has no control—such as sudden weather changes and mechanical failure—but by and large the lightplane is the one transportation device where a man is more than master of his own safety than anywhere else. He's alone. His transportation is flexible and three-dimensional. In an automobile accident it can be the other fellow's fault or a hole in the road. But the pilot is safer than

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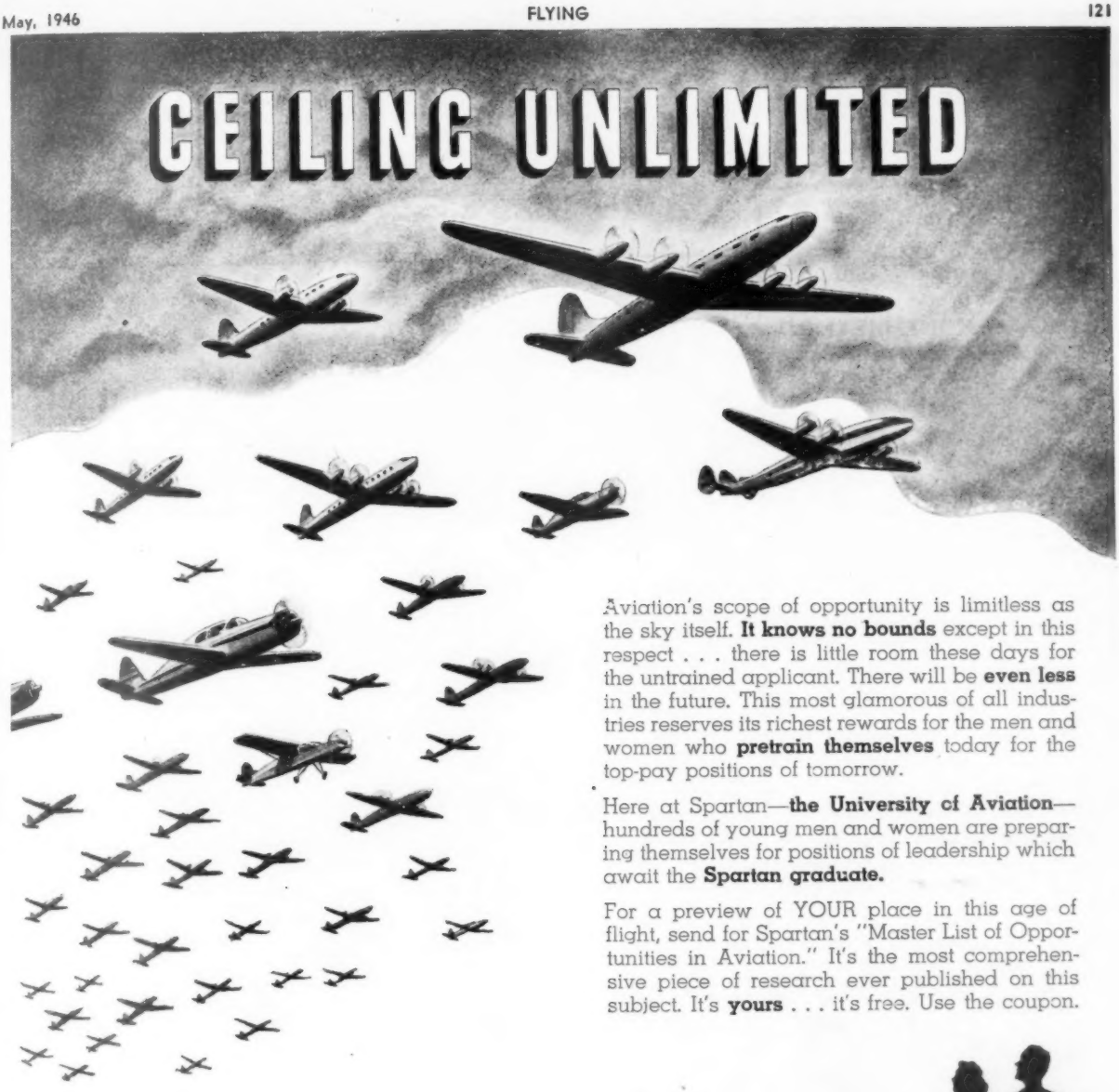

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anyone else unless he forgets all the basic rules of flying.

I should like to reiterate that as new airports are established, the lightplane and private flying will grow and develop, but it will be a sound and gradual development. We now have more orders than we have ever filled in any one year. The same applies to other lightplane manufacturers.

These airplanes will prove out where they are most utilitarian. The lightplane is a good method for making trips of 80 to 500 miles between small communities or from a large city to a small town. The first trip is as easy as the 1,000th if you have terminal airfields. Autos, buses, trains need a prepared path before the first trip can be made. Not so, lightplanes. They require only prepared terminals. They are potentially, and will become more so, the poor man's transportation. END

The Treetop Line

(*Continued from page* 54)

of that town. On the flight described in the following paragraphs, it was found that a girl had set up and operated the ground equipment at Philipsburg.

This writer flew All American's Route 49E not long ago. It extends from Pittsburgh to Williamsport, Pa. Landings are made at both ends of the route to put off and take on mail for these 11 Pennsylvania towns in between:

	Miles From Last Pickup	Population*
Pitcairn	11	6,310
Vandegrift	16	10,725
Indiana	26	10,050
Punxsutawney	26	9,482
Du Bois	15	12,080
Clearfield	15	9,372
Philipsburg	16	3,963
State College	18	6,226
Bellefonte	11	5,304
Lock Haven	23	10,810
Jersey Shore	17	5,432

* 1940 Census

The longest hop from one town to the next is 14 minutes flying time; the shortest is six minutes. Result is that the whole route must be flown at low altitude, usually between 500 and 1,000 feet above the ground.

The pilot flies his airplane toward the poles as though he were threading an invisible needle with his plane's pickup hook. With a little practice any good pilot can become amazingly accurate, according to Pilot Clyde Hauger, with whom this writer flew. Hauger didn't miss a single try on our flight, but in case of a miss the pilot simply banks around and tries again.

When the picked-up pouch actually is hooked, there is just the slightest tremor than can be felt in the cockpit. Far more noticeable is the whine of the electric winch, being operated by the flight mechanic back in the cabin.

This type of operation, then, can be duplicated anywhere in the United States—on mountain tops, in Death Valley, in the most remote village in Nevada or Idaho, if need be. In the more densely-populated parts of the country every community, even nearby suburbs of larger cities, can have high-speed air mail and air express service as many times a day as necessary. No airports are needed, other than at terminals. Any clearing or even a building top will suffice.

So be careful where you hang your clothesline from now on. END

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